

# THE IRON AGE

June 11, 1931



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Financing the Recovery .....	1883
Let's Go Back to Arithmetic .....	1884
Large Ingots for Forging .....	1888
Industrial Vacuum Cleaning .....	1892
Zirconium Alloys in Steel .....	1895
Pulverized Coal in a Foundry .....	1896
Furnace Control in Steel Making .....	1902
Piercing Bars for Seamless Tubes .....	1905
Working of Rustless Steels .....	1908
Hartford Meeting of A. S. M. E. ....	1918
May Steel Ingot Production .....	1925

New Equipment .....	1913
News .....	1923
Personals and Obituaries .....	1928
Editorials .....	1932
Markets .....	1935
Construction and Equipment Buying .....	1956

## "SOMEWHERE THE SUN IS SHINING"

"Too busy to see me today. Come back in two weeks,"  
says the G. M. "The plant is running night and day."

SO reads an Iron Age representative's report of a call on a New England lawn mower plant. Rain has been plentiful this spring. Grass has grown rapidly.

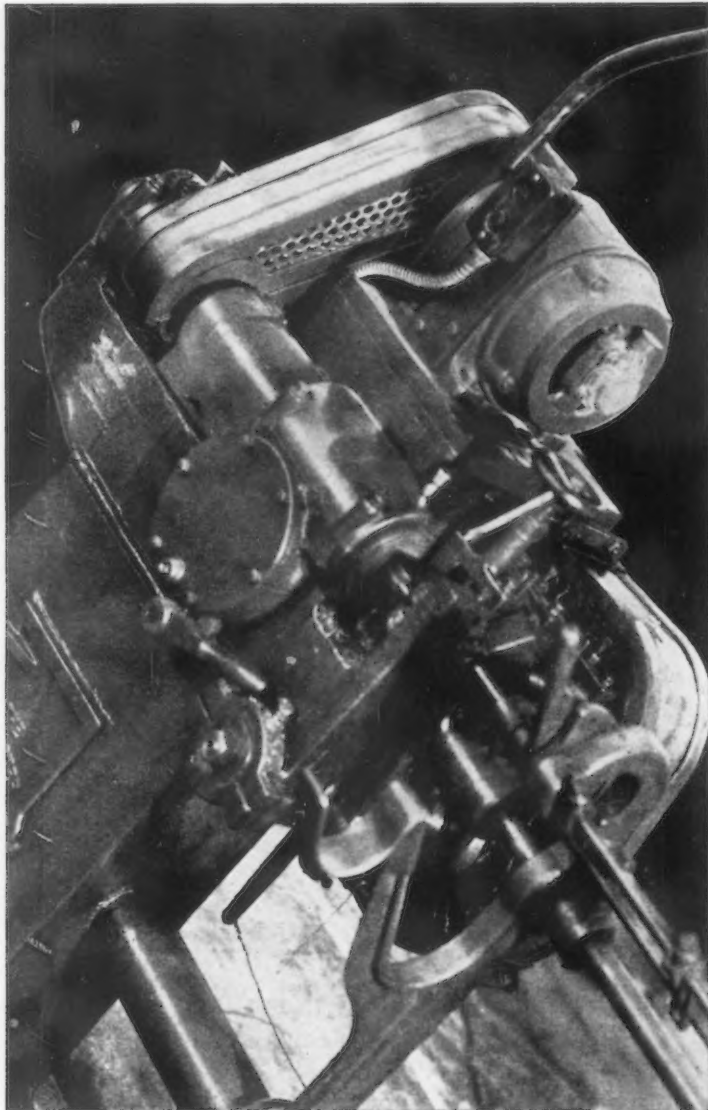
The metal-working field is so diversified that it profits by practically any kind of activity, even that of the elements. Just run your eye over this list of a few of the products made by new subscribers who started taking The Iron Age in May:

Permanent Hair Wave Machines	Popcorn Machinery
Dry Cleaning Machines	Rifle Cartridges
Advertising Novelties	Bus Bodies
Cotton Gins	Airplane Propellers
Saddle Hardware	Funeral Cars
Bedsteads	Rubber Tires
Greenhouse Equipment	Inkwells

In an industry that is favorably affected by a wave or even a ripple of prosperity in such contrasting fields as beauty culture and undertaking, aviation and equitation, not to mention motor bus and dry cleaning, you cannot expect to find at any time a state of uniform, deadly dullness, no matter how black the business sky.

—A. H. D.

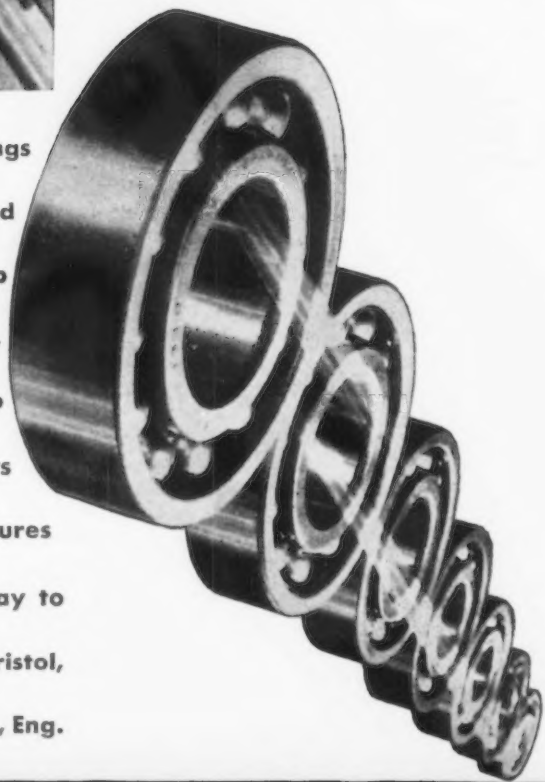
76<sup>th</sup>  
IRON AGE  
YEAR



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is on the increase

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1746

**NEW DEPARTURE BALL BEARINGS**

# THIS ISSUE IN BRIEF

JUNE 11, 1931

## NEXT WEEK

**A**PPPLIED science has revolutionized industry and our modes of living. And the end is not yet. Technical achievements in the future will be even more far-reaching in their effects than those of the past. Technical research is steadily creating new and improved products and shifting the currents of competition. Technical knowledge, and not dollars, constitutes the real capital of industry. Advances in technical research are best insured by united effort and such a unification of activities in the iron and steel industry now seems well on the way to realization. The views of three leading metallurgists on this important development will be presented in our next issue.

### How to Stimulate Business Activity

"Reduction in cost of goods and increase in average consumer income are the two logical ways to increase consumption," says John H. Van Deventer, industrial consultant of The Iron Age (page 1885). Commodity price average declined during the 30 years following the Civil War, while the annual output of manufactured products increased four times in dollar volume, eight times in actual volume. The prosperity formula that proved successful then will work today. So, urges Mr. Van Deventer, instead of cutting costs by reducing wages and in that way diminishing purchasing power, get costs down by replacing inferior with today's superior equipment.

\* \* \*

### Invention, Not Age, Determines Obsolescence

"A delusion and a snare" are the old accounting methods which arbitrarily gave production machinery a life of 15 to 25 years. Standardized rates of depreciation, calculated without consideration of obsolescence, have enticed many a company into paying out in dividends what should have been set aside for replacement reserve. Whether or not a piece of equipment should be replaced is not determined by its age, but by the availability of a better machine.—Page 1887.

\* \* \*

### How and Why a Piercing Mill Pierces

The mandrel is not forced through the metal. The rolls cause the metal to flow over and about the mandrel. Even without the mandrel the rolls would form a central cavity, for when a piece of steel of round form is pressed or hammered into oval form, several times in succession, a rupture occurs in the center that extends longitudinally. By double-piercing, which consists essentially of a second piercing operation on the already hollow billet, larger sizes of seamless tubes can be made, as the quantity of metal to be displaced is reduced.—Page 1907.

\* \* \*

### Fuel-Wasting Soot Removed by Vacuum Cleaner

A coating of soot, 1/16 in. thick, over the heating surface of a boiler, will cause a fuel loss of about 20 per cent. Vacuum cleaner removes the dust rapidly. One plant is saving \$45 to \$50 a month by "vacuuming" its boilers daily. A central vacuum system permits quick, economical cleaning of floors and equipment, helps keep dust out of product and machinery.—Page 1892.

### One Pound of Coal Melts 4.05 Lb. of Iron

When malleable foundry used a hand-fired furnace a charge of 70,000 lb., started at 10:30 p.m. could not be tapped until 3:30 the following afternoon. Now, with pulverized coal equipment, a 90,000-lb. charge started at 5 a.m. is ready to pour at 3:30 p.m. the same day. Coal, labor and time are saved.—Page 1901.

\* \* \*

### Is It Better to Recarburize Steel or to Catch the Carbon as the Heat Comes Down?

Recarburized heats have lower chipping costs, but rejections are not less. The recarburized steel gives better results in the analysis made by Dr. Herty. On the other hand, there are better physical results and greater physical regularity to be obtained from the steel in which the carbon is caught coming down.—Page 1904.

\* \* \*

### Revolving Molds, Poured Off-Center, Produce Superior Ingots

Heavy ingots for hollow forging should be poured toward the outside of the mold and not in the center, as has been normal practice. The sonims, which rise toward the liquid surface, are forced to the center and eventually into the sink-head. This prevents them from sticking to the mold wall or being entrapped in the liquid steel, ultimately causing defects during forging. Rotating the mold promotes the centering of the sonims. The risk of corner cracks is minimized.—Page 1888.

\* \* \*

### Away With Confusing Rustless Steel Terminology!

Metallurgists plead for standardized terms. Why call a steel an "iron?" T. Holland Nelson fears that in welding chrome-nickel alloys the formation of chromium carbide, with the chromium content of 50 to 60 per cent, the material immediately adjacent to the grain boundaries is impoverished of chromium, reducing the chromium content below the point necessary to maintain chromium resistance. May not the alloy contents be rearranged to produce the desired metallurgical conditions?

Says Dr. Becket, "Our experimental evidence does not yet permit acceptance of the view that changes up or down in the chromium-nickel ratio overcome intercrystalline corrosion."

Magnetic susceptibility is no indication that the steels are always subject to intergranular attack, says C. M. Johnson. Some of the most resistant steels are definitely magnetic.—Page 1908.



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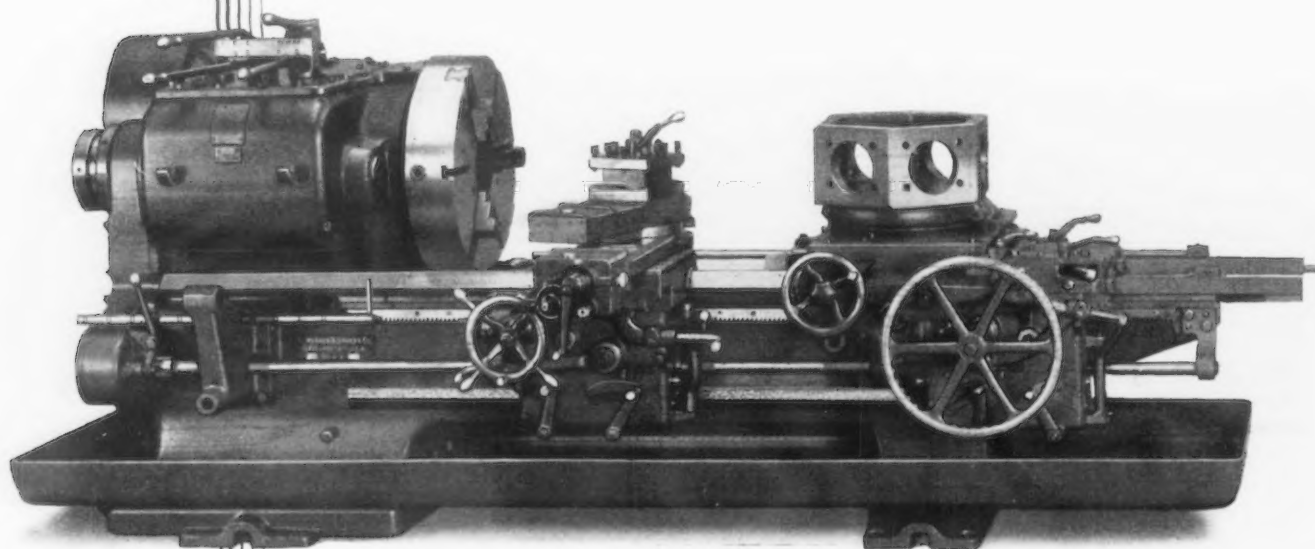
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# THE IRON AGE

New York, June 11, 1931

ESTABLISHED 1855

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## FINANCING THE RECOVERY . . .

◆ ◆ ◆  
**M**ONEY may be said to be the lifeblood of industry and business. Under normal conditions its free circulation through the arteries of commerce and the veins of industry keeps business in healthy condition.

Today industry and business are anaemic. It is not from lack of the vital fluid, but from impeded circulation. Our bankers have more savings in their care than they know what to do with.

Some way must be found to restore the circulation of funds, to give employment to these idle dollars and thus renew the vitality of our industrial and business body. A recovery must be financed, either from the top or the bottom. If consumers will not do it through the resumption of buying, our men of finance must do it through judicious lending.

The banker must learn the distinction between capital investments for plant expansion and expenditures for cost reduction. Pending business recovery, all thought of economies from volume must be dismissed. The present problem of industry is to cut costs at the current reduced rates of operation. The only effective way of doing so is through introducing better methods and better equipment. Our whole industrial history is a chronicle of steadily declining unit costs of manufacture and steadily increasing per capita production and consumption of wealth.

Wage reduction, particularly when it means a lowering of living standards, is not a safe way of cutting costs, since it nullifies the effect of the manufacturing economies achieved. Greater, rather than less, purchasing power per capita is essential to permit further growth of American enterprise. And *real* gains in buying power can come only through adopting more modern methods of production.

Modernization places a heavy responsibility on the banker. Without his support, we run the risk of further deflation of business profits and workers' income, with concomitant industrial failures and home foreclosures. To bankers, therefore, as well as industrialists, we recommend the thoughtful reading of the article which follows. In the last analysis, profitable industry and business form the one sound security back of bank deposits.



# LET'S GO BACK TO



**A** FEW years ago work was being carried on in Washington for the purpose of banishing the fluctuations of the business cycle and "regularizing" industry. At that time—it seems long ago now—you will recollect that an impressive group of economists, statisticians, labor leaders and business men of sufficient leisure to afford the time was exploring the antics of supply and demand in the hope of finding the way to secure a balance.

From what has happened since then, it is quite evident that the question of economic stabilization is too big to be settled in committee conference, unless it be a "committee of the whole" of industry and business. Of course there is this difference between today and the time previously referred to; today everyone is thinking about the future, while then most of the captains of industry were too busy making products and selling them profitably to worry about it.

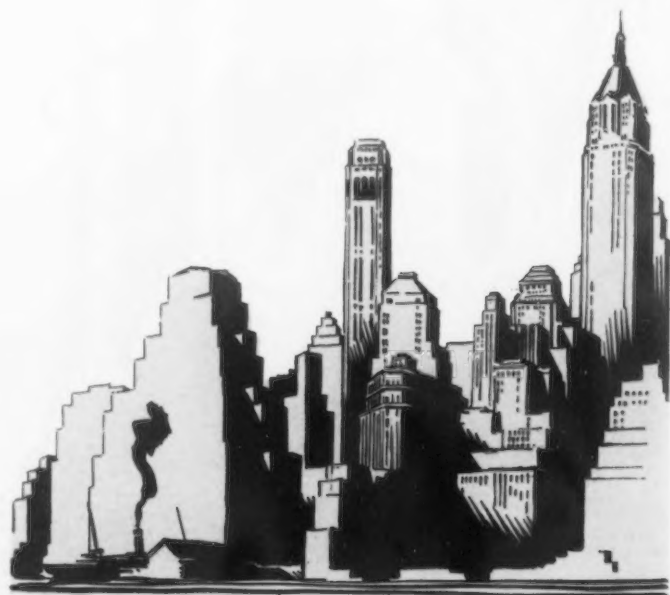
Today there is probably a great deal more thought being given to "what's ahead" than there is to "what's at hand." At no time in our history have so many high-powered mental telescopes been trained upon the economic horizon. Bankers, industrialists, labor leaders, statesmen, economists, business men and thoughtful members of the rank and file of the employed and unemployed are seriously pondering upon the whys and wherefores of economic cause and effect. The mechanism of business and industry, national and international, is receiving its most critical scrutiny from a great diversity of viewpoints. It is being studied from all sides, as well as from the top and bottom. Something is bound to eventuate from this unexampled concentration of able minds.

As a result of this movement, American finance, industry and business are unconsciously forming themselves into a committee of the whole. As yet the minds of its members "have not met," nor have definite paths of progress been defined and accepted. It is too soon to expect it. We find marked differences of opinion, for example as to whether thrift or prodigality are the more efficacious prosperity builders; whether increasing prices is a better course than lowering costs; whether wages should be maintained or lowered; whether increased mechanization aids or harms employment. Unanimity as to these things will come in natural course as more light is thrown upon them by constant examination and discussion. Already we find an overwhelming

preponderance of belief that industry and business must shoulder the responsibility for adequate employment. How long a step forward this is will be recognized by those familiar with the thinking of a decade or two ago.

## A Flood of Forecasts

The multiplying of forecasts and prognostications which have accompanied this intensive and widespread probing of the future is a natural by-product. Everyone seems anxious to give his opinion of what is forthcoming and each day adds fresh material to the growing pile of contradictory predictions. They vary from the promise of a shortly forthcoming



# ARITHMETIC

by JOHN H. VAN DEVENTER  
Industrial Consultant—The Iron Age

period of unexampled prosperity to the belief that there will be 15 years of extremely painful plodding before business once more tops its 1929 level. "Pay your money and take your choice" of predictions, for there are all sorts to choose from. It should be quite evident to us now that the soothsayer who gazes upon charts for the purpose of foretelling the future is as reliable, and no more so, as his prototype who peers into the crystal ball.

No forecaster can sketch for us the future skyline of American business. Its building will be the work of too many hands and minds—minds that are even now changing over from fixed beliefs of many

*No forecaster can sketch for us the future skyline of American industry and business. Its building will be the work of too many hands and minds—minds that are now discarding fixed beliefs and grasping new concepts.*

years' standing and grasping new concepts and principles of action.

## A Problem in Division

At the present time we are more or less inclined to grasp at straws in order to keep our heads above water, regardless of the fact that they will not bear our weight. Witness the current discussion of the advisability of raising railroad rates and other prices. Making things more expensive is not an assurance that people will buy them.

After all, the question of supply and demand resolves itself into a problem of simple division. Average annual income, divided by average cost of things bought, equals a number of things that can be bought. One cannot sidestep arithmetic. If, then, we make things cost more, without first increasing average income, is it not obvious that less things can be bought?

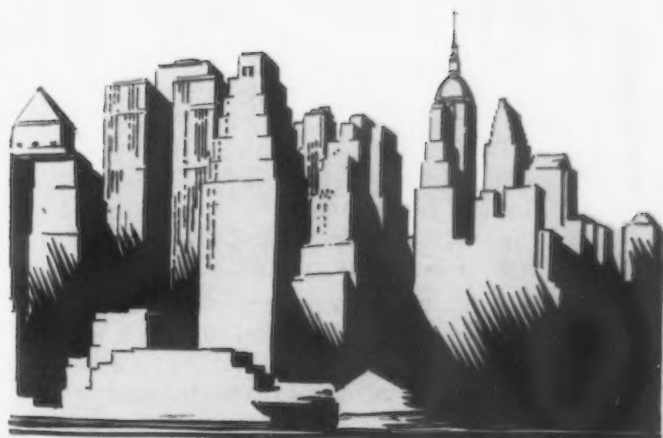
On the other hand, when we reduce the divisor of average cost, we increase the quotient of number of units purchasable. In other words, diminished cost to the consumer is the logical step toward turning out more goods and employing more people.

Reduction in cost of goods and increase in average consumer income are the two logical ways to increase consumption and hence to stimulate business activity. If there are any others, they do not fall into the category of mathematical reasonability.

During a period of 30 years following our Civil War, the average of commodity prices declined almost uninterruptedly. During this same period of receding prices we increased our annual output of manufactured products four times in dollar volume, eight times in actual volume, and multiplied the annual industrial wages paid by almost four. It was this performance that laid the foundations for a prosperity which could successfully stand the later terrific punishment of overcapitalization, inflation, speculation, graft, Government interference and excessive taxation and which failed to be shaken until the ultimate debacle of 1929.

How was this miracle of progress accomplished? Merely by giving heed to the formula *income divided by cost equals volume*.

Consciously or unconsciously, our ancestors of that period chose the one effective way to apply this formula to build prosperity. They put improved machinery to work in American industry on such a scale as not merely to compensate for the declining





prices but to make increasing profits out of them and to pay increased wages in spite of them. For real wages—measured in purchasing power—doubled during this period of shrinking prices. Thus the prosperity formula was worked two ways, by decreasing the divisor of cost and increasing the dividend of average purchasing power. What else could result except the ensuing multiplication of business volume and the diversification of industry?

#### Arithmetic Has Not Changed

A great deal of water has gone over the dam since the termination of the long 30-year period of price declines and prosperity building, but the laws of arithmetic remain unchanged. The formula that



*Water seeks the low level. Business flows to the low cost level in times of depression as well as during prosperity. Cost reduction in the plant is more effective than high pressure selling outside of it.* ▲ ▲ ▲

our predecessors used so effectively to pull themselves out of a great depression is as good today as it ever was. Why are we not putting it to work?

One reason, perhaps, is that industry, business and life in general have been made to appear so complicated by constant dissection, classification, psychoanalyzing, forecasting and the magnification of minute details that the whole is lost sight of in the elaboration of its parts. We are not thinking simply and clearly nowadays.

Perhaps that is what President Hoover meant when he recently cautioned American business to avoid "panaceas" in the attempt to effect a recovery. Panaceas there are in plenty to choose from, but they won't get us anywhere. We need to stick to arithmetic.

Some one has said that the way to get the best of a depression is to "outsit" it. The thought is that

if you do nothing for a time a depression will become discouraged and go away of its own accord. Plenty of people are trying to outsit this depression. But it is getting them nowhere. Sitting seldom does.

We cannot outsit this depression, but we can outwit it. The way to do this is to use the same method that put the panic of 1873 to flight, and built prosperity in the face of a declining price trend. When prices fall, make costs go down even faster. Get the formula busy, through industrial modernization.

After all, machinery is our one great cost reducer. It would be a tremendous job to cut the cost of a hand worker's output 25 per cent, preserving his wage rate and the quality of the goods. But give him the proper machine and he will produce ten parts for the former cost of one, earn a better wage rate and turn out a better product. That's working the prosperity formula two ways at once!

Wage cuts will not increase industrial or business volumes because they reduce the dividend (purchasing power) in the same measure that they reduce the divisor (cost). The quotient (volume) remains the same as before, unless perhaps the worker retaliates for wage cuts through diminished output or strikes, in which case it is less. Nothing gained here.

Prices are too low in many industries. Low prices are only beneficial to the public and non-ruinous to the maker of the goods when they permit a profit margin. This condition of profitless pricing is particularly apparent today in such commodities as steel and copper. In such industries, where efficiency levels are already high, price adjustment upward seems essential. All the more reason then, for cost reduction in other branches of industry not so well mechanized for production.

With such exceptions, however, the increase of prices, whether in freight rates or other forms are not the way out. The formula tells us that. No one who is advocating price increases is suggesting that wages be raised too. Thus, if prices be raised, we find the divisor increased, the dividend unchanged and the quotient (volume) decreased.

Improvement in industrial mechanization through the replacement of inferior with superior equipment is one way to reduce the divisor of cost, increase or maintain the dividend of purchasing power and hence increase the quotient of volume. It's not a panacea, but a time-tested method of restoring and building prosperity.

#### Is Superior Equipment Available?

Is today's production equipment sufficiently superior in cost performance to warrant the cost of modernization? Decidedly yes, in the average plant and the average industry. There are exceptions, of course, but, by and large, American industry could cut its costs one-third by replacing its obsolete machinery with up-to-date equipment.

Ideas concerning obsolescence are changing rapidly and will change still more in the years to come. We are learning that it is more profitable to discard hale and hearty machines than to wait for them to wear out, provided that sufficiently better ones are

to be had. Our conceptions of fixed and standardized rates of depreciation on equipment have been sadly jolted, with the realization that age has little to do with obsolescence and invention nearly everything to do with it. The old accounting methods which arbitrarily gave production machinery a life of from 15 to 25 years have turned out to be a delusion and a snare. They have enticed many a company into paying out in dividends what should have been set aside for a replacement reserve. An insurance actuary who estimates the probable life of his prospect as twice what it should be is making no more costly or dangerous error than the factory accountant who does the same with industrial equipment.

#### Modernization Creates Employment

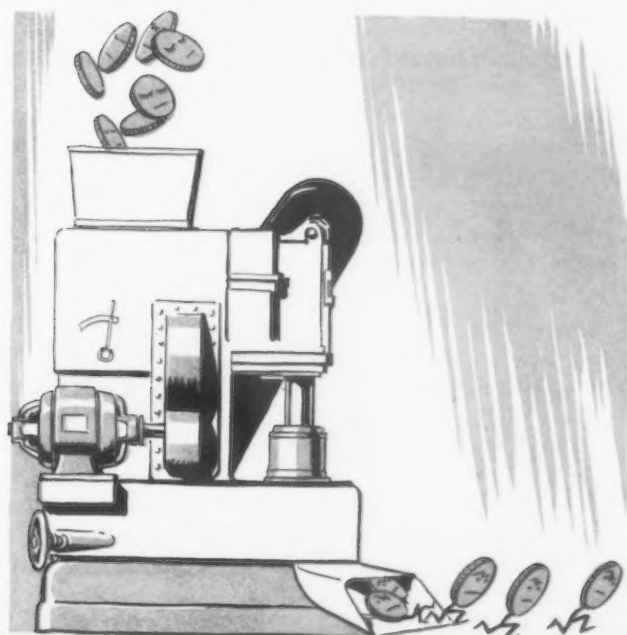
Some executives who are thoroughly convinced that the replacement of existing equipment would be profitable to their companies hesitate to take action at this time because they think that further mechanization might increase unemployment.

We must look at this problem in the large way, not in the small way, because depressions, like booms, affect all of us and not a few individual concerns. Looking at it in the large way, unemployment can only be diminished by creating a condition which will result in a greater volume of business. Unemployment will only diminish when people buy more things. But how can they buy more with unaugmented or diminished income unless costs be reduced?

The formula tells the story. Unless we can raise average income, the only possible way to create more volume is to reduce average cost. That is why mechanization, instead of making jobs scarce, makes them plentiful when we apply it *honestly* to the formula.

"But," some one asks, "Did not American industry

*Improved machinery is the best rejuvenator of sick and sleepy dollars. Modernization of America's industrial equipment, through intelligent replacement, will put our idle dollars to work and multiply jobs for our idle men.*



*Beware of false depreciation rates. An insurance actuary who estimates the probable life of his prospect as twice what it should be endangers the security of his company. So does the accountant who sticks to precedent in writing off depreciation.*

apply mechanization more intensely than ever in the decade following the war? Why then the depression? Something is the matter with the formula."

The formula is not to blame; it was not applied *honestly* during the past decade. It was applied honestly during the post Civil War price decline.

Machinery multiplied wealth during the past decade in a measure greater than ever before. But speculation, inflation, Government overhead, graft, racketeering, overcapitalization and other voracious prosperity-destroying vermin multiplied even faster. Cost reductions were not passed along to consumers in the measure they should have been to reduce the divisor. Average income was depleted by the nibbling of the non-productive vermin, and wages were not increased in the same proportion to output as during the 30-year price decline. Improved machinery was doing its part, but we were not doing ours.

#### In Steps the Banker

Modernization of American industrial equipment and the consequent stepping up of production efficiency and stepping down of unit costs will play a large part in determining the future skyline of American business. So will the banker, who, through the control of cash and credit, is in position to say how far this modernization will extend and where it can take place.

The banker has a heavy load of responsibility upon his shoulders today, not merely in the safeguarding of the twenty-eight billions of American savings that are now entrusted to his care, but in so investing them that they will properly multiply. There is no reward here or hereafter for the custodian

(Continued on page 1934)

# LARGE STEEL INGOTS

## FOR FORGING

By HERBERT H. ASHDOWN  
Consulting Metallurgist, Irvine, Pa.

**S**OME 25 years ago the writer first experimented with 2000-lb. ingots by applying lateral pressure to the walls of split ingot molds during solidification, with a view to liquidating the segregate and closing the pipe. At this same period ingots of similar weight were cast in molds placed on a slowly rotating table, mainly with the same ultimate object.

With a view to elucidating some of the problems in casting heavy ingots, a number of small experimental ingot molds were made in direct proportion to the 268,800-lb. mold. From the same ladle from which these heavy ingots were cast, steel was cast into the experimental molds and efforts were made to cool these at the same relative rates as the full-size ingots. These experimental ingots were sectioned and examined and it was found that the tendency to segregation was the same as in the full-size ingots.

### Taper Wall to Show Chill Effect

To study the chill effect of the mold walls on the metal, a mold normally proportioned inside was cast with a taper wall, as shown. Zinc ingots were cast, *A* with the thick section at the base, while for ingot *B* the mold was reversed, the thick section being at the top. The quicker cooling of the lower portion of ingot *A*, due to the thickened wall, illustrates its advantage in the production of a sound ingot, and also shows how the formation of the base cone is depressed which, in steel, would be removed by a small percentage of bottom discard.

Conversely, in ingot *B*, with a slow cooling base and quickly solidifying head, an extensive pipe is formed in addition to a long base cone, a portion of which would remain in the finished forging. As stated by Brearley in 1916, in his paper on steel ingots, this base cone is anything but desirable, as a line of considerable weakness is developed, due to the junction of the chill crystals, and also the inclosed segregates. This weakness may sometimes be observed when forging the bottom end of large

ingots; the body of the ingot will open out slightly, forming a small annular space with the base of the cone.

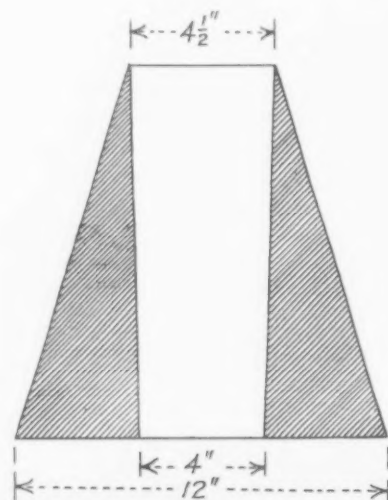
### Artificial Cooling and Heating

Proceeding with a normal ingot mold, ingot *C* was cast hot and extreme cooling conditions were effected. The bottom plate or stool was water-cooled while the major portion of the mold was kept hot by gas rings and a gas flame kept impinging on the surface of the molten metal in the mold.

The influence on the development of the bottom cone is of outstanding interest, while the growth of the entire crystalline structure shows an upward sweep. In the case of steel, the segregates may well be conceived to lie between these marked crystalline boundaries.

Ingot *D* was cast at normal temperature and a ring, water spray, was applied from the middle-half downward, while the top half was kept hot with a gas ring and the metal kept liquid at the top, as in ingot *C*.

It will be appreciated that, due to the rapid rate



Special test ingot mold, to observe the effect of thickness of mold wall.



▲▲▲

**R**OTATING molds for forging ingots during the process of casting accelerates solidification, thereby arresting segregation, insuring a more uniform analysis, preventing structural weakness and shortening pipe. Other ways of improving the quality of steel ingots, including the water-cooling of ingot molds, are also described in the accompanying article, which is based on a paper delivered at Chicago before the American Society for Steel Treating. In closing the discussion of his paper the author outlined a method of double-pouring large, round ingots.

▼▼▼

of solidification of steel in very small ingots, it is more difficult to retard its progress with a view to promoting segregation. Sulphur prints of ingots cast from metal remaining in the ladle after casting a 44,000-lb. ingot, however, conform to what might be anticipated, and correspond closely with results obtained from the zinc ingots.

It was thought that, by the addition of aluminum to the still liquid discard portion of a large ingot, the solidifying point would be depressed and retarded, and thus stimulate the flow of segregates from the main body of the ingot to this area and lead them up to the still more fluid sink-head. Five pounds of aluminum was therefore added to the liquid metal when within 6 in. of the top of the mold, and casting continued as usual into the sink-head. It was however found that, by this addition, the freezing point of the serviceable metal well below the portion treated was depressed also, and that segregation was developed rather than lessened.

#### Practical Cases in Forging Work

In the manufacture of large hollow forgings, the usual procedure is to remove the top and bottom discard and trepan the core. The latter may be as much as 25 in. in diameter. Providing little ghost marking has been detected on superficial examination, it has been considered safe to proceed with the forging. Considerable anxiety has sometimes arisen, when machining the bore of such forgings, to find well developed ghost marks distributed over a large area.

Another cause of annoyance to manufacturers of large ingots is ingot corner segregation and corner cracking. These two defects are first cousins and, if not perceptible to the unaided eye, can usually be detected by sulphur printing the ingot corners of the discard face. These defects, however, often do not run the full length of the ingot, and the worst location generally is about 4 ft. from the base. When the ingots are allowed to go cold, the corners should be ploughed into and examined, as these defects usually are deeply seated and are

not disclosed until the corners are removed down to a diameter equivalent to the octagon face of the ingot.

#### Ingots Big-End-Up

Much has been said and written concerning the advantages and disadvantages of casting ingots big-end-up. This method is unquestionably the best where careful casting conditions are not observed. But equally good and sometimes better ingots are cast, big-end-down, where the casting temperature and rate of teeming are carefully controlled and efficient sink-head provided.

One advantage of this latter method is that the mold can be stripped at an earlier stage, the ingot partially cooled in air, and then, through the critical periods, allowed to cool more slowly by dropping over the ingot a refractory lined casing. Further, where ingots are to be trepanned for hollow forging, the question of pipe is of little moment. For this same purpose and to remove the risk of refractory materials falling from the sink-head into the mold or steel during casting, it is not uncommon to use unlined sink-heads.

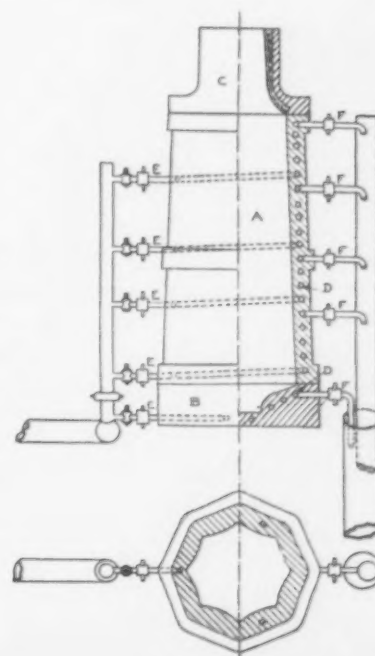
Experience has shown that, by casting these heavy ingots toward the outside of the mold and not in the center, as has been normal practice, markedly superior results have been obtained. This method is greatly facilitated by revolving the ingot mold at a comparatively slow speed during casting. In the case of octagon ingots the sonims, which always accumulate on the rising liquid surface, are forced to the center and eventually brought into the sink-head. This prevents patches of the sonims sticking to the mold wall and being entrapped in the rising liquid steel, ultimately causing deep surface defects during forging.

Further, the hot metal in the mold is more equally distributed, giving a less steep gradient from outside to center. This minimizes the risk of corner segregation and corner cracks, reduces the pro-

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Ingot mold with air or water cooling, for observing effect of chilling.

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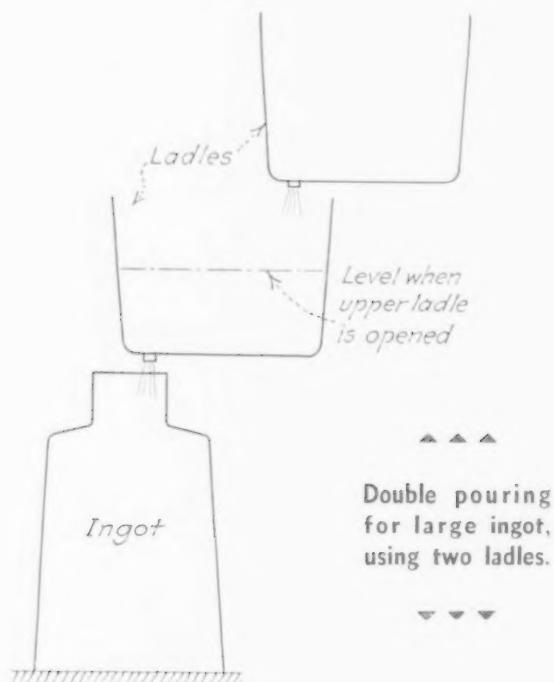


nounced dendritic ingot structure and has a marked effect on the distribution of the segregate.

#### Cylindrical Ingots Have Advantages

A further development during the past twelve years has been the manufacture of heavy ingots of cylindrical form. Many thousands of tons of these ingots have been made without loss, up to 179,000 lb. in weight, and larger ones will follow as the existing octagon molds become worn.

The advantage of this form of ingot is that it eliminates all corner defects, and the sonims are brought more readily into the center of the mold during casting. It reduces forging costs and in



the manufacture of hollow forgings removes the risk of the ends bursting.

Some years ago the writer introduced an air or water-cooled mold. A series of steel pipe coils was encased in the walls of the mold, which also strengthen the mold, and through which the cooling media are "drawn" and circulated. Some hesitance has been expressed relative to the use of water, but if this is "drawn through" on the same principle as applied to the water-cooled tuyeres of the blast furnace there is no need for reluctance as, in the event of leakage, water would cease to flow and air follow.

It will be noted, the cooling coils are in stages, so that the level of the fluid steel in the mold may be followed up, or the rate of cooling controlled, at any desired portion of the mold. The mold may also be retained at any desired temperature until the liquid steel has been cast.

From a number of 67,000-lb. charges, two 21,000-lb. ingots were cast from the same ladle in exactly the same type mold, one being water-cooled while the other was allowed to cool normally. At each cast the ingots were run alternately, No. 1 in the water-cooled mold, No. 2 in the normal mold, and vice versa.

In every case, during the whole of the casting period and throughout their cooling, it was possible for one to place his hand on any portion of the walls of the water-cooled mold. With the normal mold, in a very short time the walls became red hot and, owing to the radiant heat, one could not get within several feet without considerable discomfort.

From analyses taken on the outside of 16 in. diameter cores, at intervals of 12 in. from the base upward, the following are the average of four, in each case:

#### CARBON ONLY (A at Bottom End)

	A	B	C	D	E	F	G	H	I
Water Cooled	0.29	0.29	0.29	0.29	0.30	0.30	0.29	0.29	0.31
Normally Cooled	0.29	0.29	0.33	0.33	0.33	0.34	0.34	0.34	0.35

With the water-cooled ingot not only was the carbon uniformly distributed, but also the sulphur, phosphorus and nickel. In the case of the normally-cooled ingot, these elements were migratory with the carbon.

#### Discussion on Steel Ingot Practice

ROUND ingots came in for considerable discussion, with regard both to the size of the ingot and the quality that could be obtained. George A. Dornin expressed the opinion that large, round ingots are not commercially successful, partly because they are too slow in production. Up to 18 in. in diameter or thereabouts round ingots seem to be all right; above that his experience seems to indicate an epidemic of slag inclusions.

When we have 30 to 40 min. in which to pour a 100-ton heat, each 3-ton ingot must be poured in from 60 to 80 sec. The speaker does not think that the skin under those conditions forms fast enough to withstand the ferrostatic pressure. He expressed the view that the chipping costs in the average well managed plant eat up about 10 per cent of the earnings of the plant. Rejections because of poor surface duplicate this loss.

Another speaker reported having introduced copper into the material of his molds for the purpose of using its high conductivity to take the heat away quickly from the surface of the ingot, and thus to form a heavy enough skin to withstand subsequent pressures. From this he went to a copper ingot mold, cooled with water.

In closing the discussion, the author brought to notice an interesting manner of producing a large, round ingot of great size—50 to 100 tons. This is cast with the big end down and with a sinkhead at top taking about 22 to 25 per cent of the steel. Two ladles are used, one of which is set on a carriage so that the other may be brought above it, somewhat in the manner of the sketch.

When the lower ladle is about half empty the upper ladle is opened up and the steel from this source, which is somewhat hotter than the other, runs into the lower ladle at such speed that the level in the lower ladle is kept about uniform until the upper ladle is empty. This maintains over a long period a virtually uniform ferrostatic head, and consequently keeps the rate of flow about the same during the greater portion of the period.



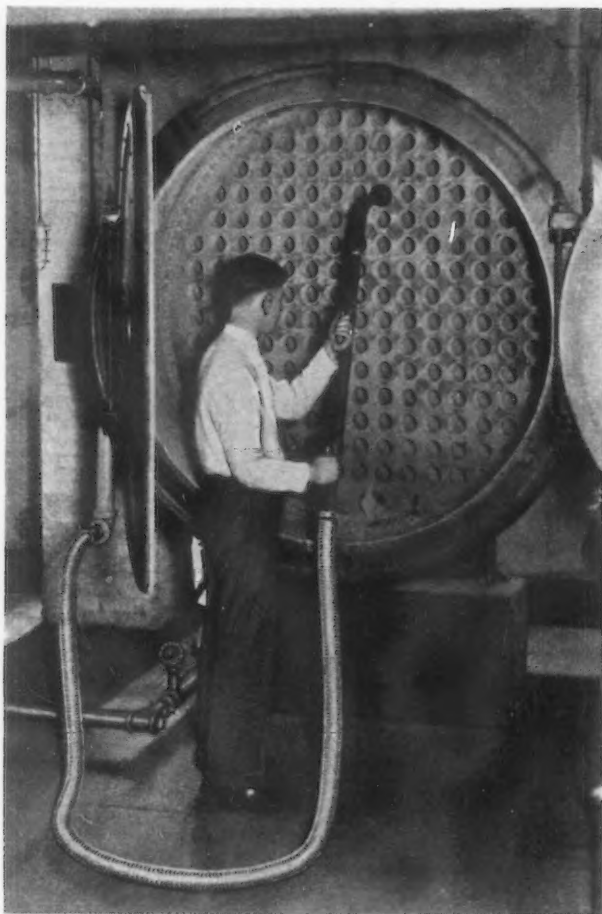
*Photograph by Colorado Fuel & Iron Co.*



### TAPPING THE OPEN-HEARTH FURNACE

THE open-hearth tapping operation requires perfect coordination between groups of men working on two sides of the furnace. From the front of the furnace a long rod is used to locate the clay plug which closes the tapping hole at the back of the furnace. At the same time two or more workers brave the terrific heat of the back side of the furnace to scoop out the clay as the plug is broken down, so that the molten metal, when the tapping hole is finally opened, will have unobstructed passage to the pouring ladle.





# PLANT VACUUM

By **LESTER C. SMITH**  
Engineer, Spencer Turbine Co.,  
Hartford, Conn.

**T**O paraphrase a hackneyed expression, frequently heard in these days of popularized psychology, the industrial world is becoming "dirt-conscious." Manufacturers are coming to realize more and more the importance of pleasant surroundings for the workmen. Statistics have proved that employees in a comfortable and attractive shop can turn out more work than those having to perform their tasks amid disorderly and unpleasant conditions. For this reason the cleaning, as well as the lighting, heating and ventilating of factories, is given far more consideration today than ever before, and mechanical equipment has been developed and applied to meet the needs of modern industry in this respect. The purpose of this article is to describe some of the services that the vacuum cleaning system, especially of the central or stationary type is rendering to industry.

As usually installed, the central vacuum cleaning system comprises a vacuum producer and a dust separator located at a convenient point in the building. From the separator a carefully designed piping system extends to all parts of the plant. Numerous inlet valves are located on each floor to permit the attachment of the cleaning implements. Each operator is supplied with a 50-ft. length of vacuum hose, a floor handle and cleaning tools especially designed for the work to be done. For instance, if the floors are made of concrete one type of brush is required; an entirely different type of cleaning tool is used on hardwood floors. Dust and litter, drawn into the cleaning tool, pass through the piping system

into the separating tank, which is periodically emptied and the refuse burned or reclaimed. Although it is customary to install a central vacuum cleaning system at the time a building is erected, the equipment may readily be installed in older plants.

## Central System Adapted for General and Special Services

The central vacuum cleaning system is rendering at least five distinct services to industry. These are:

- 1.—Rapid and thorough general cleaning.
- 2.—Cleaning return tube and sectional boiler flues and the boiler room.
- 3.—Cleaning of electrical and power plant equipment.
- 4.—Removal of dust at its source when necessary to prevent explosions and to safeguard the health of employees.
- 5.—Removal of excess material in manufacturing processes.

The following brief descriptions of actual installations illustrate some of these types of service.

Sweeping and similar methods of cleaning by hand have been entirely replaced by the vacuum process for general factory cleaning at a large watch-making plant in Illinois. There, the daily use of a stationary vacuum cleaning system has been found effective in the removal of dust which, if scattered, would work havoc with the fine mechanism of the watches. In addition, the vacuum machine is employed in connection with certain production

# CLEANING SAFEGUARDS

## MEN AND MACHINES

processes, thereby serving a dual purpose. In this plant a considerable amount of valuable material, including watch jewels and scraps of precious metal, is recovered from the separating tank of the vacuum cleaner.

Other establishments which have found the use of vacuum equipment profitable for general cleaning include representatives of such widely differing industries as food packing and heavy machinery building. In the former, cleanliness, of course, is of paramount importance; in the latter industry it also has a definite value.

### Special Applications of Vacuum Cleaning

In addition to the use of vacuum equipment for general cleaning, there are many specialized applications which have resulted in savings in operating costs. Such applications include the cleaning of boilers and flues, equipment for which service usually is installed as an addition to the regular vacuum cleaning system serving the entire plant.

When it is realized that a coating of soot, 1/16 in. thick, over the heating surface of a boiler will cause a fuel loss of approximately 20 per cent, the need for thorough cleaning is apparent. The vacuum cleaner permits rapid removal of this dust, whether the boiler is of the fire tube or the sectional heating type. Another advantage is that soot may be removed while the fires are banked; it is not necessary to generate high pressure steam as must be done when the tubes are blown out. This alone effects an appreciable saving of fuel and helps to make the fire room more comfortable.

Actual tests of boiler installations that are vacuum cleaned daily have shown interesting results. In one plant fuel savings amounting to \$45 or \$50 a month were found; in another test a 150-hp. fire-tube boiler showed a saving of 250 lb. of coal a day as the result of a daily vacuum cleaning. Inspection of the tubes or sections of a boiler which is regularly vacuum cleaned usually shows the metal to be clean and bright.

In the maintenance of electric power plant equipment, the vacuum cleaner has also been found advantageous. Although most power plants are kept in a scrupulously clean condition, it is only recently that efficient cleaning methods have received the at-

tention and study that they deserve. In many modern power plants, however, there is a daily routine of vacuum cleaning, starting in the breaker house, then on through the pulverizing or other fuel handling plant, boiler room and into the turbine and generator room.

As it is realized that dirty windings, connections, commutators and other dirty electrical machinery are likely to give trouble, there is a systematic vacuum-cleaning of this equipment, including even the switchboards. Moreover, dust, picked up from the floor and machinery by the suction of the cleaning tool, is entirely removed, not merely scattered into the air only to settle again in other parts of the



*The Iron Age, June 11, 1931—1893*

plant. Consequently, frequent renovation of walls and ceiling is unnecessary.

Another application of vacuum cleaning in the maintenance of electrical equipment is in telephone exchanges where it has been found that even the slightest traces of dust interfere with the operation of automatic switchboards. Insulated vacuum nozzles have been developed which permit thorough cleaning of the automatic panels without shorting the electrical circuits.

#### Reducing the Dust Explosion Hazard

A serious fire and explosion hazard has been virtually eliminated at the plant of a well-known soap manufacturer in the East by the operation of a



vacuum cleaning system which was installed some time ago. Those familiar with the soap industry know that powder and dust arising from the manufacturing processes literally cover the machinery, floors, walls and overhead structure of the plant. Spontaneous combustion and dust explosions may occur if this dust is allowed to accumulate. In addition, accidents are likely to be caused by the slippery powder on the floor. Men from each of the three shifts, which keep the machinery in this soap plant on a 24-hr. basis, are assigned to the vacuum cleaning work. They spend their entire time operating the specially designed vacuum cleaning tools which remove the soap powder before it has a chance to accumulate to any extent.

Another instance of the use of vacuum cleaning equipment to lessen the danger of dust explosions is found in the grain elevators of a large industrial alcohol plant in the Middle West. These elevators are vacuum cleaned daily to remove accumulations of dust from floors, frame work and other parts of the structure. Even more necessary is the vacuum

cleaning system at a nearby plant where corn syrup is refined because corn produces more dust than most other grains.

#### Vacuum Cleaning Safeguards Health

Not only in the improvement of working conditions but also in safeguarding the health of employees is the operation of a vacuum cleaning system frequently of value, as at the plant of a manufacturer of white lead and other lead products. Formerly the health of the workmen was seriously endangered by the quantities of lead dust which were produced during the grinding of pig lead. It is practically impossible to remove lead dust with a broom, as those familiar with the properties of this material will realize. Although a certain amount of the dust can be collected by sweeping, a gray smear will remain. By the use of a central vacuum system with cleaning implements specially designed to pick up the heavy lead dust, it is possible to do a thorough cleaning job. For instance, the girders, which in this particular plant are painted red, are made bright and clean simply by passing a vacuum tool of the proper design over the surface. Virtually every trace of the lead powder is removed, and this without scattering any of it into the air.

Another important service rendered by vacuum systems is in the removal of excess material produced during various manufacturing processes. Although, strictly speaking, these installations might not be considered to be vacuum cleaners, having no part in the removal of incidental dirt yet, they do remove unwanted material by suction and so might properly be mentioned in this article.

A machine tool builder in the East experienced difficulty in the cutting of internal cams. Chips thrown off by the cutter accumulated in the cam groove, causing the tool to jam or run out. This trouble was eliminated by the installation of a small flexible suction nozzle which could be inserted in the cam groove behind the cutting tool. This nozzle draws away the chips as fast as they are produced. A similar suction nozzle removes wax shavings produced by the stylus which cuts the sound tracks on the records used in the production talking pictures by one process.

#### An Aid in Enameling Operations

Removal of excess enamel from metal parts prior to baking is a valuable service performed by the vacuum system in the finishing industry. Here, enamel is sprayed on a metal part and allowed to dry. Then a templet is applied and the required design outlined. Before placing the part in the glazing oven, however, it is necessary to remove the enamel coating extending beyond the stencil. This is easily accomplished by loosening the dried coating with a small brush, resembling a clothes brush but equipped with a vacuum slot surrounded by bristles. All of the enamel powder passes through the flexible handle of the brush to a separator connected to the central vacuum producer. Individual separating tanks may be installed for each color of enamel used, thus permitting the material to be reclaimed.

In addition to preventing waste of enamel, the



vacuum system eliminates a serious danger to the health of the employees. Enamel dust is similar to ground glass and if scattered about is likely to injure the lungs of the operators. The vacuum brush collects the enamel powder rather than scattering it into the air.

Many other central vacuum cleaning systems, serving as many industries but differing only slightly in the work accomplished, might be described. Those outlined above are typical, however, and will, it is hoped, serve to show the use of the vacuum cleaner by modern industry.

## Zirconium Alloys in Steel Manufacture

THE use of zirconium alloys for deoxidation and purification in steel making and the effect on physical properties were discussed by Ph. Guy in *Aciers Spéciaux, Métaux et Alliages*, November, 1930, in part as follows:

Experience has shown that the full benefit of zirconium is secured only in the presence of silicon. The analyses of two types of zirconium-silicon alloy are as follows:

	Type A, Per Cent	Type B, Per Cent
Zirconium .....	35 to 40	12 to 15
Silicon .....	47 to 52	39 to 43
Iron .....	6 to 10	40 to 45
Carbon .....	0 to .5 max.	0.20 max.

The tendency of zirconium to combine with oxygen to form  $ZrO_2$  is so great that it permits more thorough deoxidation of steel than is possible with manganese or silicon. Work at the United States Bureau of Standards has shown that residual oxygen, after treatment with zirconium-silicon alloys, is only one-half to one-sixth as great as after treatment with ordinary ferrosilicon. It is evident that the greater the percentage recovery of the deoxidizer in the slag, the greater has been its action on the impurities and especially the oxygen in the bath.

A series of 40 tests in basic electric furnaces has shown an 85.8 per cent recovery of a 0.219 per cent silicon addition as ferrosilicon, while in the form of a Fe-Zr-Si alloy, 0.206 Si gave a 97 per cent recovery and 0.15 Zr gave 59.7 per cent recovery. This elimination of impurities insures fewer rejections and better fabricating qualities.

Zirconium combines with one-tenth its weight of nitrogen to form cubic microscopic crystals of lemon yellow nitride  $Zr_3N_2$  which tend to pass from the metal to the slag. Numerous experiments have shown that these crystals do not appear in steels containing less than 0.25 per cent carbon, and that their number increases as the zirconium addition is increased from 0.04 to 0.15 per cent, remaining practically constant after that. This upper limit is ascribed to a limited nitrogen content of 0.008 to 0.009 per cent in ordinary steel, while below the lower limit it appears that all the zirconium unites with oxygen. The influence of zirconium on nitrogen content is shown by the following comparison of melts made with and without Zr addition:

Zr Addition, Per Cent	Zr Recovery, Per Cent	Per Cent Nitrogen and Nitrides	
		With Add'n	Without Add'n
0.13	0.7	0.0034	0.0062
0.15	0.10	0.0023	0.0072
0.15	0.13	0.0059	0.0086
0.16	0.09	0.0024	0.0072

With seven-tenths its weight of sulphur zirconium forms the sulphide  $ZrS$ , which resembles  $MnS$  in appearance, but is insoluble in 1:1 hydrochloric acid. Addition of zirconium was observed to lower

the ratio of manganese to sulphur required for satisfactory hot rolling of sheets from about 3 to 0.5. In a steel containing 0.318 per cent S, addition of manganese and zirconium together equivalent to only 0.67 of this amount was found to permit satisfactory rolling; in another steel an amount equivalent to 0.92 of the sulphur produced a like result.

Zirconium has not been shown to combine with phosphorus. However, when added to high phosphorus steel, the cold brittleness is lowered. Such fragility may be caused in part by the oxygen and nitrogen content of the steel.

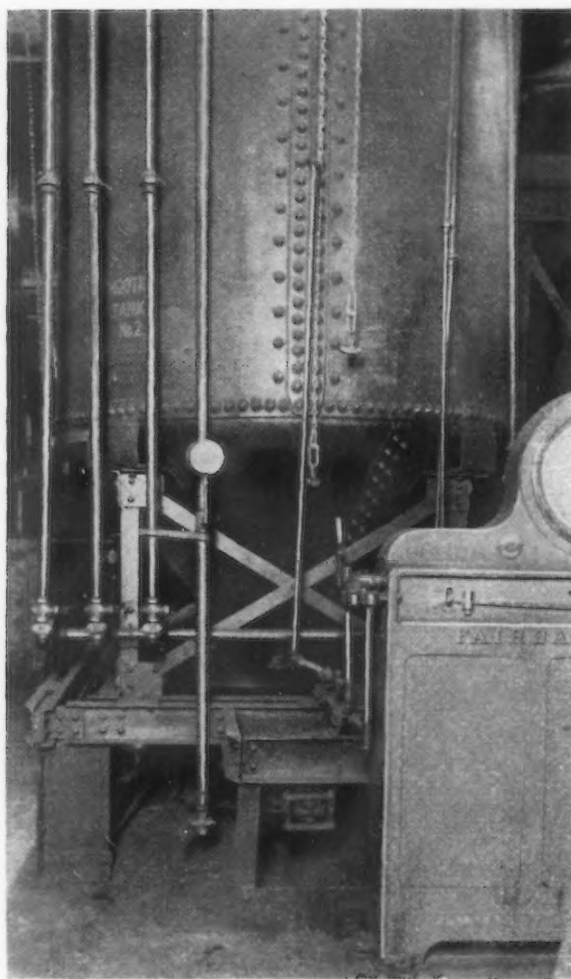
The influence of zirconium on physical properties was shown by comparison of the effects on various steels of the following additions:

- 1.—0.2 per cent Si and 0.04 per cent Zr as a 10 per cent Zr, 70 per cent Si Fe-Si-Zr alloy.
- 2.—0.2 per cent Si as ordinary ferrosilicon.
- 3.—0.2 per cent Si and 0.15 per cent Zr as a 48 per cent Si, 36 per cent Zr alloy.

In low phosphorus (0.01 to 0.03 per cent P), 0.17 to 0.78 per cent carbon steel the chief result of zirconium addition was to reduce the elastic limit about 3 per cent. Addition No. 1 gave an ultimate strength superior to additions Nos. 2 and 3, which were about equal in this respect. In high-phosphorus steels (0.12-0.17 per cent P) the adverse influence of phosphorus on the Izod numbers was counteracted by addition No. 3.

Addition of zirconium to high-sulphur steels resulted in a ductility little inferior to that of low sulphur steels of like composition. Comparison of longitudinal and transverse tests showed an improvement in Izod numbers, but little influence on tensile strength or elastic limit. In improving the properties of high-sulphur steels, 0.15 per cent Zr is usually sufficient to eliminate the influence of the small amount of sulphur remaining after the action of manganese; further addition of zirconium merely displaces manganese from its sulphide. Zirconium in considerable amount confers on carbon steel tensile strength comparable to that of special steels.

By reason of their freedom from gas evolution, steels treated with zirconium are especially suitable for producing difficult castings. High sulphur steels show improved machinability and rolling qualities when made with zirconium; exceptionally fine screw stock may be made with a 0.15-0.20 per cent zirconium addition. In special nickel, chrome, and chrome-nickel steels defects produced in forging or rolling by segregation of oxides are reduced to a minimum by addition of zirconium, owing to the rapidity and homogeneity of its deoxidizing action. Chrome steels are improved in machinability by addition of an Fe-Zr-Si alloy.



**A**T the bottom of each of two 15-ton pulverized coal storage bins is a 5-ton so-called shooting tank mounted on a weighing scale.

It has been quite customary to write a description of a pulverized coal plant installation shortly after being placed in operation and invariably closing the description with these words, "The plant has not been in operation a sufficient length of time to give accurate results." The present case will be different. It covers a pulverized coal installation for the Erie Malleable Iron Co. at Erie, Pa., that has been in continuous operation since November, 1924.

The installation is unique also, because it is the first installation of a complete pulverized coal plant in which the equipment was designed to meet the varied conditions found in this foundry. All of the material, with the exception of the pulverizers and motors, was fabricated in one shop; the erection of the equipment, including the placing in operation, was performed by one organization—Heyl & Patterson, Inc., of Pittsburgh, Pa.

We know the foregoing facts will appeal to those who have purchased equipment of this kind f.o.b. their works and have had to erect the equipment with their own labor, assisted by a set of blue prints and a supervising engineer. This arrangement, as a rule, proves costly for the purchaser, because in no

# PULVERIZED COAL

By C. F. HERINGTON

Consulting Engineer, New York

case, to the writer's knowledge, has the cost been within the estimate made at the time of signing the contract. The actual cost has always exceeded the estimate, sometimes as high as 100 per cent.

The first installation of pulverized coal for malleable annealing ovens in this country was made at the Erie Malleable Iron Co. in 1890. The credit for this installation belongs to B. J. Walker (the father of the present president), who designed the combustion chamber and invented the burner known as the Walker burner. At the time the contract was signed for the new installation, the Walker system was in use on 26 annealing ovens, divided into two groups one of 12 and the other of 14 ovens. Each oven had its individual pulverized coal storage bin with a separate combustion chamber and a Walker burner. Later the storage bins were supplanted by one large storage bin for each group of ovens, using a distributing system with branches to each oven.

The melting furnaces, which were hand fired and of 35 tons capacity, with one heat per day, using no top blast but depending entirely upon stack draft, are each equipped with a remote storage bin with a distributing blower and pipe line terminating in a single burner at the furnace with a secondary air blower at the burner.

The works of the Erie Malleable Iron Co. cover an area of two city blocks, bounded on one side by the street and the Bessemer & Lake Erie Railroad, and on the other by the main line of the New York Central Railroad.

The former installation of pulverized coal on the annealing ovens consisted of two small plants located adjacent to the groups of ovens. Each plant consisted of a rotary coal dryer with elevator and a Kent pulverizer, with the necessary screw conveyors to convey the pulverized coal to the separate storage bins at each oven. The new and present coal plant is located in the enlarged space in Works No. 2.

The flow sheet is as follows: The raw coal is brought into the storage space under a shed and is dropped into a track hopper having a capacity of 50 tons. An apron feeder delivers into a 24 x 24-in. two-roll coal crusher giving a product that will pass through a 1-in. ring.

# EXPERIENCES IN A MALLEABLE IRON FOUNDRY

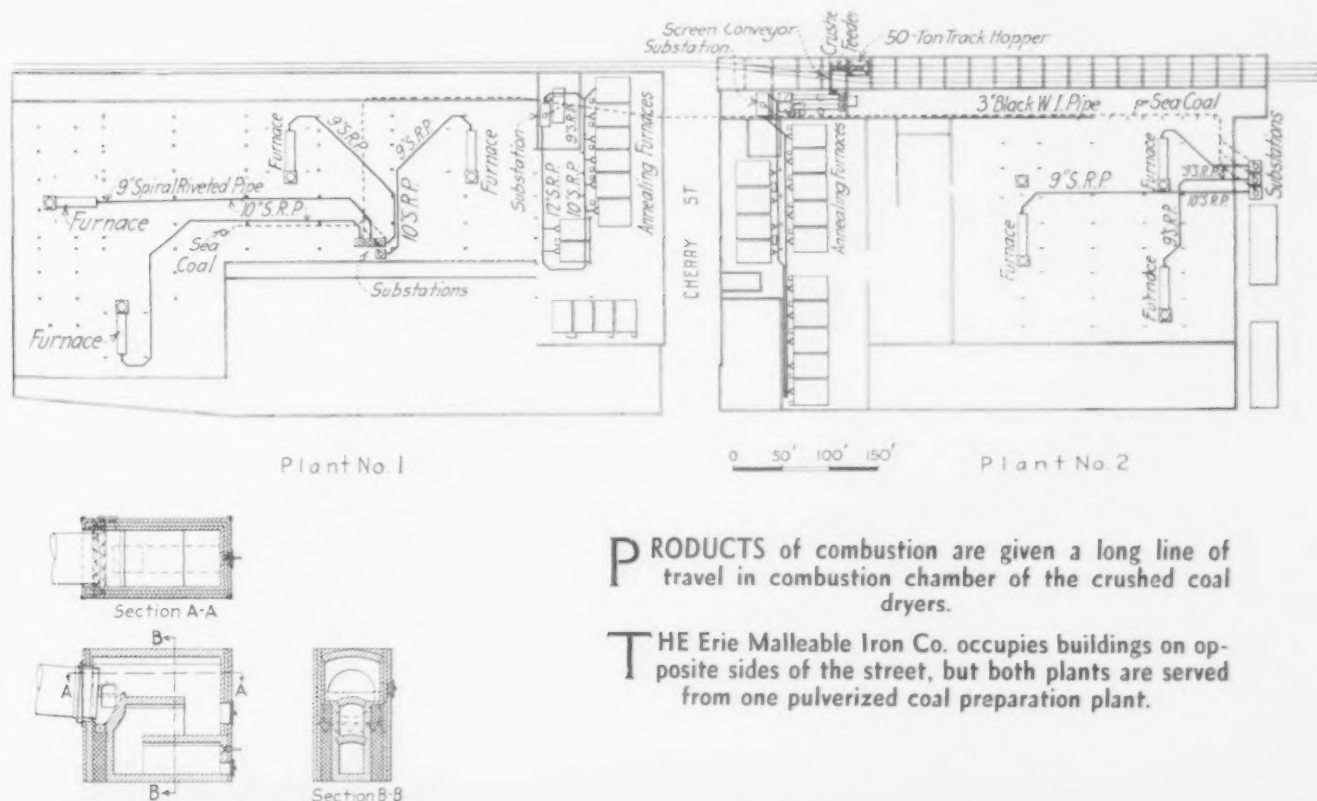
**P**ULVERIZED coal has been used in the works of the Erie Malleable Iron Co. since 1890. In 1924 a new installation was made. A charge of 70,000 lb. used to require 17 hr.; now for a 90,000 lb. charge, 10½ hr. suffice. Coal consumption on the basis of a year's running (1929) is given as 1 lb. of coal to 3.29 lb. of iron melted.

The crushed coal leaves through a 12-in. screw conveyor, depositing to either of two bucket elevators (one used as a spare) and is elevated and delivered to a 150-ton capacity concrete coal bunker. From the bunker gates open upon a belt conveyor over a magnetic head pulley and a chute from the belt feeds two rotary coal dryers. The iron findings are dropped through a separate chute to a receptacle on the ground floor.

The dryers are equipped with a by-pass so that the same chute receiving the coal can deliver to a screw conveyor which can convey the coal directly to the feed bins, or the same conveyor is used to convey the dried coal from the dryer to the feed bins when the dryers are in use. There are two 5 ft. diameter by 50 ft. long single shell rotary coal dry-

ers fired with pulverized coal through a single burner each. The supply of pulverized coal for firing these dryers is secured by placing two of the auxiliary collectors from the pulverizers over a small bin so that the fine coal from the main collectors is deposited in this bin; and from this bin two feeders and two small blowers direct connected to 3-hp. motors, one for each dryer, are to blow the coal dust into the combustion chamber. The stack draft is used to secure air for combustion.

The illustrations include a cross section through the combustion chamber of the dryer. The long travel of the hot gases before coming in contact with the coal to be dried eliminates any danger of the coals catching fire. An additional precaution is taken by equipping each dryer with a recording



**P**RODUCTS of combustion are given a long line of travel in combustion chamber of the crushed coal dryers.

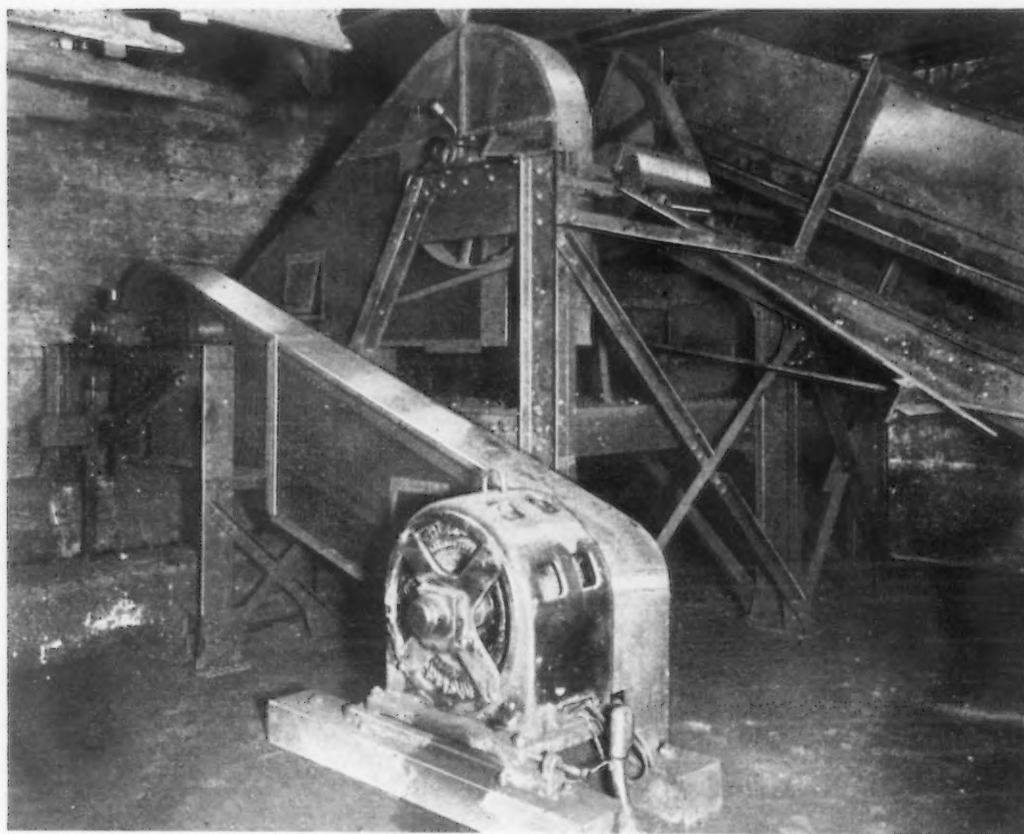
**T**HE Erie Malleable Iron Co. occupies buildings on opposite sides of the street, but both plants are served from one pulverized coal preparation plant.



thermometer with the couple placed directly in the path of the hot coal falling into the discharge chute from the dryer; and the recording gage is connected up so that when the temperature of the discharge coal reaches 250 deg. F. a bell is set ringing, warning the coal operator, who immediately shuts off the feeder and the coal dust blowing into the combustion chamber is stopped.

The grinding or pulverizing apparatus of the coal plant consists of four 6 tons per hour capacity

The operation of "shooting" coal is very simple: By opening a slide gate in the bottom of the pulverized coal bin by means of an air cylinder, and lifting up a bell valve into the tank, pulverized coal flows through a pipe filling the tank to the number of pounds desired, as indicated on the dial of the scale. When the required weight of coal is in the tank, both valves are closed and compressed air is admitted into the top of the tank, passing down through the pipe and into the coal, thoroughly aerat-



▲ ▲ ▲  
COAL from a track hopper is lifted by an apron feeder into the coal crusher, which discharges into a screw type conveyor for delivery to the coal bunker.  
▼ ▼ ▼

Raymond Brothers impact pulverizers, complete with four No. 11 exhausters. Each pulverizer is direct connected to a 75-hp. 2200-volt 3-phase 60-cycle slip ring motor running at 480 r.p.m. synchronous speed; while the exhausters are driven by a 40-hp., 1200 r.p.m., squirrel cage motor, direct connected through a coupling, each exhauster being equipped with roller bearings.

The coal is pulverized to a fineness so that 85 per cent will pass through a 200-mesh screen. It is exhausted through a vacuum separator and delivered into cyclone separators placed on top of two 15-ton capacity pulverized coal storage bins. At the bottom of each bin is placed a 5-ton shooting tank, which is placed on a Fairbanks platform scale with an indicating dial.

Referring to the plan of the works, the pulverized coal is transported from the preparation plant to each of the substation bins through a 3-in. pipe by means of compressed air at pressures varying from 40 to 65 lb., according to the distance the coal is delivered.

ing the coal. When this valve is closed, another valve is opened, which places the pressure on top of the aerated coal. Then, after seeing by the indicator panel what valve is to be opened for a particular bin, the valve is pulled open by means of a chain and immediately the coal "shoots" to the bin. It is received at the bin through a small cyclone collector placed on top of the bin and vented to the atmosphere. The air is separated from the coal dust, which drops into the bin.

This arrangement is in keeping with the Board of National Fire Underwriters in not having any storage bins of pulverized coal under pressure.

One of the illustrations shows a group of these substations placed outside of the foundry. The upper pipes are the 3-in. galvanized transport pipes, which carry the coal to the bins. The lower and larger pipes are the ones that carry the coal and air to the furnaces and ovens.

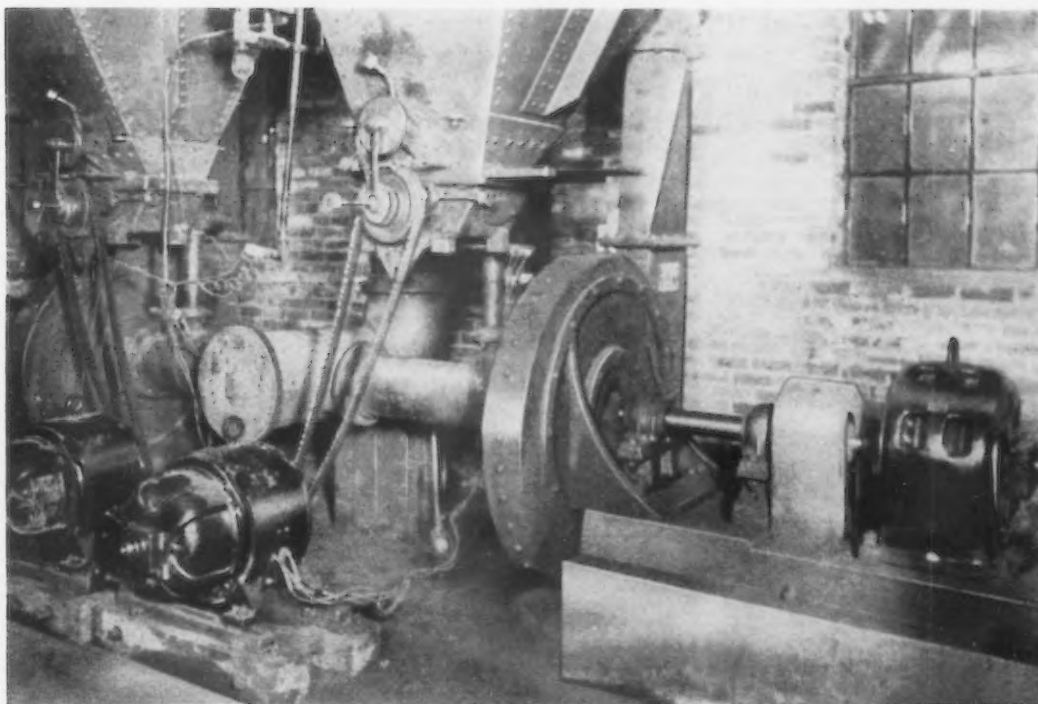
The advantages of this simple shooting are many:

- 1.—There is no mechanical power (outside of the air) or motors required to move the coal.

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TWO of the blowers at a sub-station which take both air and coal for delivery to a burner.

▼ ▼ ▼



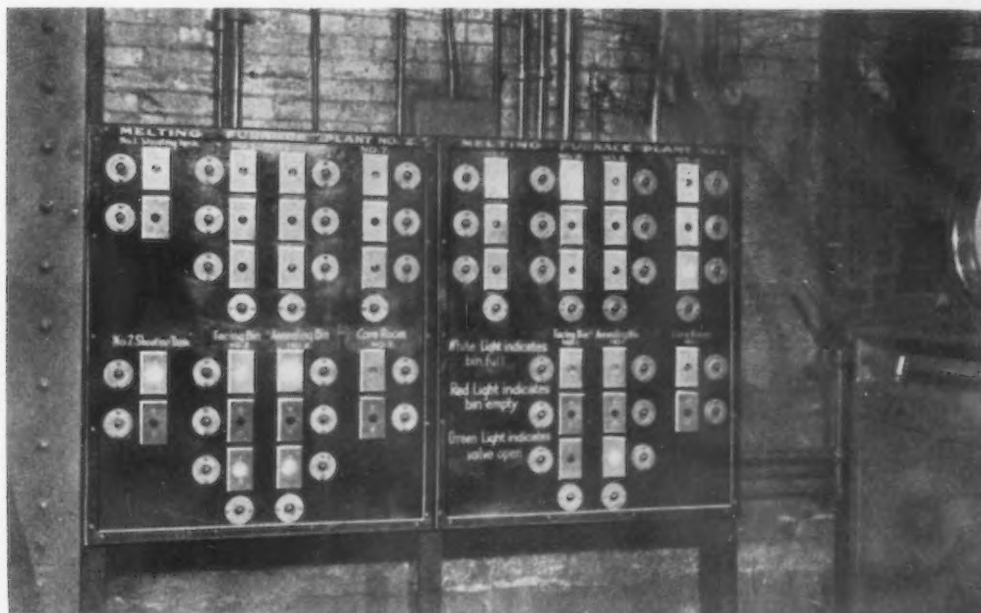
- 2.—The use of compressed air is not continuous; therefore it is more economical.
- 3.—Each tank has a capacity of 5 tons, loading and discharging in 15 to 20 min., and using the air but 8 to 10 min. of this time, besides maintaining only an initial pressure of 40 to 60 lb. during this time.
- 4.—No maintenance charges on any of the equipment. The writer knows of one installation transporting coal to different parts of a plant covering five city blocks that has been in operation from 1917 to 1927, delivering an average of 80 tons of coal a day and no repairs or adjustments have been made during this time.

An indicator panel board tells the coal plant operator the whole story. It places upon him the re-

sponsibility of keeping the different substation bins full of coal at all times, so that the heaters at the furnaces need not worry at any time as to the coal supply.

There are seven melting furnaces, four located in Works No. 1 and three in Works No. 2, and two groups of annealing ovens. Each system has its separate substation bin as has also each melting furnace, so that the amount of coal used by each furnace or each system can be recorded after being weighed on the scales.

Under each substation bin there is a feeder or controller, a distributing blower and spiral riveted piping leading to each melting furnace. Each one of these lines ends at the burner at the furnace. The additional secondary air is admitted into the straight



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AN indicator panel board tells the coal plant operator when a bin is empty.

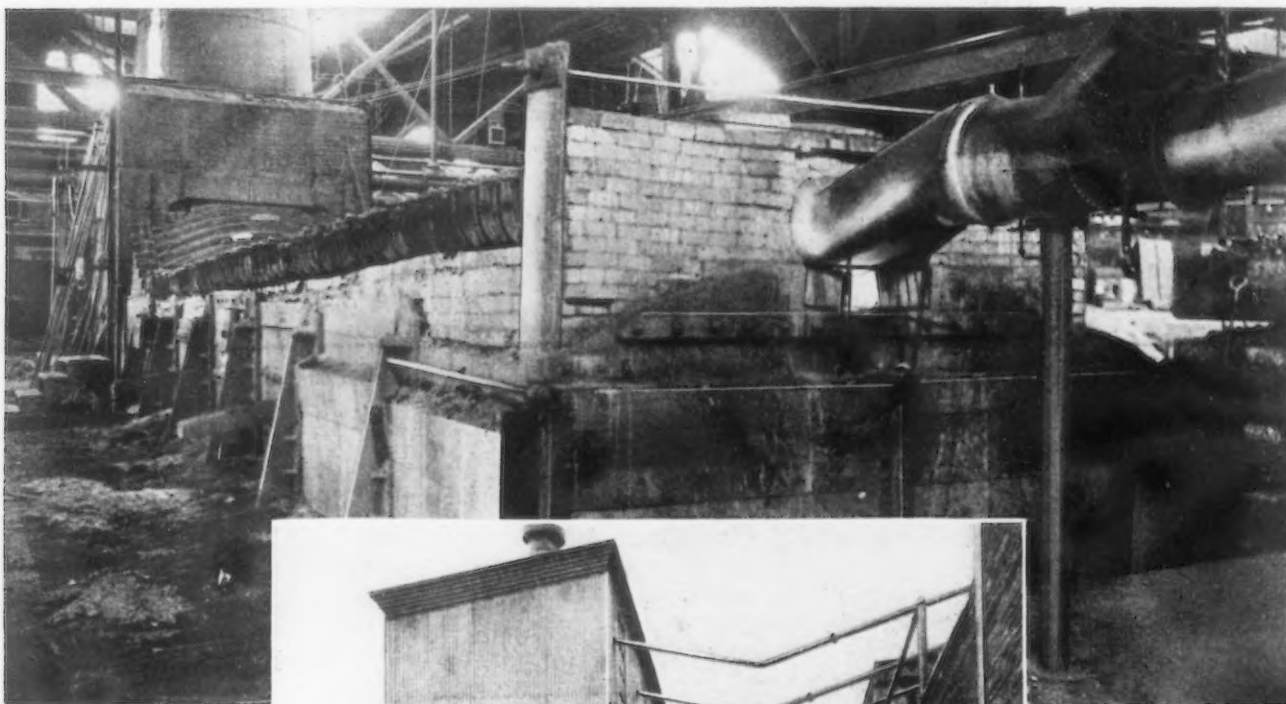
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run of the fitting, which air is controlled by a damper, while the coal dust is admitted to the burner through the Y branch and mixed just before entering the furnace.

The method of feeding the coal into the suction side of the blower is shown in one of the pictures, although this picture was taken immediately before the electrical connections were placed in a conduit.

cu. ft. of air to a pound of coal), in suspension at a velocity varying from 4000 to 5500 lin. ft. per min. And as this air is used in combustion, the power required to distribute the coal dust to the furnace is not wasted. The balance, or two-thirds of the air, is all that the secondary air blower is required to furnish.

At the firing end a burner is located, and just



At each furnace, additional secondary air is admitted into the straight run of the fitting, while the somewhat aerated coal dust comes through the Y-branch.

▲ ▲ ▲



The upper pipes, 3 in. in diameter, carry coal to bins at points of use; the lower, larger pipes carry coal and air to nearby furnaces.

▲ ▲ ▲

The two blowers are drawing in the air from an elbow open just above the tee connection, while the 3-hp. variable speed motor driving the feed screw is shown on the floor. The blower is a special cast iron blower with self-aligning roller bearings, and is driven by a 15-hp. constant speed motor running at 1800 r.p.m.

Only enough air is admitted into the blower to carry the mixture of coal (which amount is 50 to 60

back of this burner a panel board contains a rheostat for controlling the speed of the variable speed motor which drives the feed screw; also a control lever for the secondary air blower; and an instrument for showing the number of revolutions per minute that the feeder is turning so that the operator knows exactly the rate he is feeding coal to the furnace.

It requires only one man to start all the blowers



for the four melting furnaces, and all that is necessary is to place a lighted torch in front of each burner. It then requires only a few moments of his time before all of the furnaces are burning brightly; and there is no further work to do for the next four hours, but to walk around and gradually increase the amount of coal and secondary air being admitted to each furnace until slagging time. These same 35-ton melting furnaces are now melting 45 tons in much shorter time with pulverized coal than they melted 35 tons with hand firing.

For instance, it was the custom to start a hand-fired furnace containing 70,000 lb. of iron at 10.30 at night; at 3.30 the next afternoon they tapped the furnace and poured. All this time they fed coal into the furnace. Now, with a 90,000-lb. charge, they light the fires at 5 o'clock in the morning and are

ready to pour at the same time in the afternoon, with a saving of coal, labor and time.

During 1929 the ratio on No. 2 furnace was 3.29 lb. of iron melted to 1 lb. of coal, covering the year's output. In December, using a brick bottom 9 in. thick on a sand foundation, the capacity of these melting furnaces has been increased to 70 tons, just twice the capacity at hand firing. Starting this melt at 10 p. m. and pouring at 3.30 p. m., the ratio has been found to be 4.05 lb. of iron to 1 lb. of coal. In the melting furnace they are melting 1 ton of iron in 14.5 min. and using about 34 lb. per min.

The pulverized coal plant was designed, installed and placed in operation by Heyl & Patterson, Inc., Pittsburgh, under the supervision of George R. Metcalfe, vice-president, Erie Malleable Iron Co., and the writer.

## Influence of Molybdenum and Nickel on Cast Iron

THE properties of synthetic and commercial cast iron as influenced by 0.25 to 0.5 per cent molybdenum, with and without the addition of 1 to 2 per cent nickel, have been investigated by J. Challan-sonnet (*Revue de Metallurgie*, December, 1930). The synthetic cast irons were prepared from electrolytic iron and contained about 3.7 per cent carbon, all of it combined, and to this appropriate additions of 56 per cent ferromolybdenum and a 94 per cent Ni-Si alloy were made.

Dilatometer results showed no effect by these additions on the Curie point of the cementite. The  $A_r$  transition was at 1340 deg. F. for all irons containing molybdenum. The influences of nickel and molybdenum were additive in lowering the  $A_r$  point. Molybdenum opposed the graphitizing tendency of nickel in the 3.7 carbon alloy free from impurities.

Various additions were also made to commercial irons of the following analyses:

	Total Carbon	Combined Carbon	Silicon	Man-ganese (Per Cent)	Phosphorus	Sulphur
A .....	3.5	1.4	1.4	0.4	0.075	0.02
B .....	3.7	0.9	2.6	0.5	0.10	0.04
C .....	2.6	2.0	2.4	0.4	0.07	0.04

Addition of 0.25 to 0.5 per cent molybdenum increased the hardness of alloys A and B but did not increase the content of combined carbon, but in C the hardness and the quantity of combined carbon were both increased. Similar effects were observed in the presence of nickel.

In gray iron, small additions of molybdenum tend to give the graphite a nodular appearance. In the presence of nickel, the molybdenum counteracts the tendency of nickel to diminish the dimensions of the graphite. In the nickel cast irons containing 2.5 per cent carbon, molybdenum reduces the graphite content without changing its form. Nickel and molybdenum both tend to refine the structure of pearlite. The graphitizing effect of silicon and nickel in the

alloys studied appeared to be additive and to annul the antagonistic influence of molybdenum. Contrary to the effect of vanadium, molybdenum does not interfere with the development of martensite in nickel irons rapidly solidifying in sand.

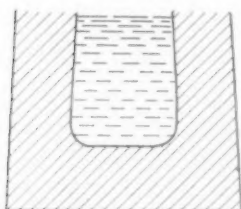
About 40 per cent increase in compressive strength was observed on the addition of 0.25 to 0.5 per cent molybdenum to iron A, which is a reasonable result as molybdenum tends to round off the graphite and to make the pearlite sorbitic. Bending strength in iron A was increased 30 per cent by molybdenum alone, and 50 per cent with the combined addition of nickel. In the high silicon iron B, molybdenum did not increase the bending strength, and in the combined addition only the nickel seemed effective. The strength of alloy C was increased as in alloy A, but with an increase in combined carbon. Molybdenum additions increased the resistance to shear of irons A, B and C about 30, 100 and 37 per cent respectively. Nickel did not improve the effect of molybdenum.

A POCKET-SIZE handbook of 212 pages on concrete construction has been published by the Universal Atlas Cement Co., 208 South LaSalle Street, Chicago. It is well illustrated, with both line cuts and half-tones, showing qualities of concrete, and methods of applying it in building and other construction. Engineering information is given in profusion in tabular and other form, together with sketches designed to be of assistance in applying the data.

A 64-PAGE pamphlet issued by the National Council of American Shipbuilders gives a great deal of information regarding the status of the steel shipbuilding industry of the United States. It gives, in an appendix of statistics, the basis for a comprehensive survey of the shipping and shipbuilding activities of the United States over the past few years. To a lesser degree the shipbuilding activities of the world are surveyed.

# STEEL QUALITY AS A MATTER OF FURNACE CONTROL

**D**ISCUSSING the influence of temperature and atmosphere on reactions in the open-hearth furnace, Dr. Charles H. Herty, Jr., United States Bureau of Mines, Pittsburgh, raised the question as to how we can control the amount of iron oxide going into the slag, heat after heat. In melting the ingredients of steel in a furnace we have oxygen,  $\text{CO}_2$ , and water vapor present. All three of these will oxidize the metal being melted. There is a considerable amount of iron oxide



**S**OLIDIFYING base of an ingot as the molten interior gradually becomes solid, a growing concentration of gases takes place in the portion still liquid.

in the slag if the scrap in the charge is small stuff, because of the excessive oxidation over its large exposed surfaces.

In this connection Professor Trinks expressed a preference for melting in an atmosphere which is slightly oxidizing, that is, a non-luminous flame. Otherwise there is an excess of oxygen in the early part of the travel of the flame and we get over-oxidation of the steel. We must have oxidation—otherwise we cannot make steel—but it is not good practice to have too much. Using a short flame at first, and then gradually lengthening it in the refining period, so that it will lie on the bath like a rug, is recommended. To this end we must have apparatus permitting control of the flame.

A mixture of coke oven gas with blast furnace gas was reported so much heavier than the coke oven gas alone that it hugs the bath better. For this reason it is a desirable feature. Trouble sometimes comes with a high pile of unmelted scrap, which will deflect the incoming gases against the roof and cause local damage.

## Hot Metal vs. Cold Metal

**S**EVERAL operating men reported noting no difference in the quality of steel obtained from a hot-metal charge compared with a cold-metal charge. What preference was expressed, however, was

wholly in favor of hot metal. One metallurgist thinks we can obtain slightly greater uniformity in the heats if hot metal is used.

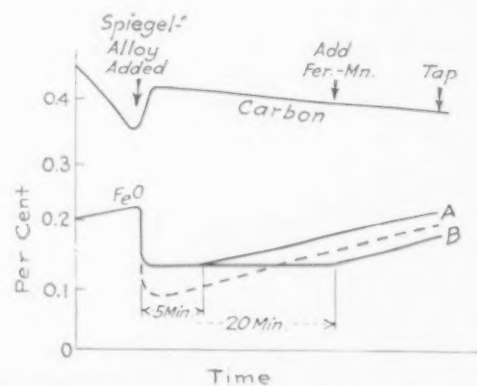
## Solubility of Gas in Steel

**M**OST of the gas coming off from rimming steel consists of carbon reacting with iron oxide, according to the observation of Dr. Herty. This changes the solubility of  $\text{CO}$ , with the result that most of the exuded gas is  $\text{CO}$ . Experiments have shown a little more nitrogen from a test in killed steel than in rimming steel. This was explained through some nitrogen being thrown off as the steel rims. Any research into this problem of gases and their solubility would, it was stated, be a long-drawn-out affair.

One operating man expressed the view that solubility of gases in steel increases with the temperature, in contrast with liquids. He thinks that the gases in metals are in some sort of combination, rather than separately as gases.

Referring to the reaction of  $\text{C} + \text{FeO} \rightleftharpoons \text{CO} + \text{Fe}$ , Dr. Herty pointed to the fact that this reaction stops with time as evidence that  $\text{CO}$  is soluble in steel. If this were not so, the reaction would continue indefinitely and we would obtain a carbon-free steel. Then everybody could compete with the American Rolling Mill Co.

Referring to a sketch, a cross-section of the bottom of an ingot undergoing solidification, he stated that, as the steel solidifies inward from the shell, we get a concentration in the still liquid portion of



Graph of carbon and  $\text{FeO}$  changes in closing stages of an open-hearth heat, showing effect of adding spiegel-alloy and subsequent conditions in the bath.

CO, FeO and oxygen. This is in spite of the lowering temperature. The CO carries off oxygen with it, becoming CO<sub>2</sub>. If we put in silicon for killing the steel, this quickly diminishes the CO content to a very low level and leaves no FeO for the oxygen to react with.

### Quality Control for Killed Steel

**M**ANUFACTURE of an acid steel for forging purposes was described briefly by the operator of such a plant. He has two 25-ton furnaces with Isley control, making 14 heats each furnace in a week of 6 days. The ingots vary from 10 in. to 44 in. and in weight from 1650 to 60,000 lb. Oil is used as fuel, with preheated air.

In this practice about 1300 heats are obtained from each set of checkers without replacements. During this period, however, the checkers are cleaned about six times. The cleaning consists of chiseling the dirt off the first part of the checkers—whatever can be reached. The rest is cleaned with compressed air. Most of the steel made in this plant is of the alloy type. Deoxidizers are placed in the furnace about 30 to 45 min. before time of tapping.



Manganese recovery is from 55 to 80 per cent, depending upon the type of steel being made.

### Quality Control for Rimming Steel

Residual copper on a deep drawing steel has not reduced the ductility if the copper is held within certain limits, according to one of the metallurgists present. However, steel of this quality takes more power in the press. It has a higher elastic limit after we once start to cold work it.

Two operators reported no difference in the manner of working such a heat. One man stated that he can easily pick out by inspection the copper-bearing steel, because of the difference in the condition of the edge of the sheet.

### Progress Report on Avoiding Excess Oxide Inclusions

**F**OLLOWING up the series of semi-annual reports on experimental work in making steel, Dr. Herty told of making a number of heats of steel from 0.40 to 0.50 per cent carbon, and using 55 to 60 per cent of hot metal in the charge. He showed by diagram the effect of putting into the furnace the special spiegel alloy used for dioxidizing, about 25 min. before the time to tap the heat. As will be noticed, the carbon content of the steel jumped at once from about 0.35 per cent to perhaps 0.45 per

▲ ▲ ▲  
**B**ETTER steel is resulting from the care which is applied to making it. And this care is gaining in intelligent application, through the interchange of ideas, experiences and "grievs" of the operating men. What the open-hearth committee of the American Institute of Mining and Metallurgical Engineers had to say on these topics is covered in this article and those in our issues of May 21 and 28. The present article deals particularly with inclusions and segregation.  
▼ ▼ ▼

cent, and remained at about that level during the period before tapping. Ferromanganese was put in much closer to the time of tapping than the spiegel-eisen alloy.

Simultaneous with the effect shown in carbon content of the steel is that in iron oxide. This was about 0.20 per cent at time of spiegel alloy addition. It dropped sharply to 0.12 per cent and then continued at that level for a period of from 5 to 20 min., depending upon the condition of the slag. Then the iron oxide began a slow climb, reaching close to its former level of 0.20 per cent by time of tapping. Increasing the spiegel alloy addition to 3500 lb. instead of 2500 lb. brought the iron oxide further down—to 0.08 per cent, for instance, and then, following the dotted line in the sketch, it gradually increased up to the point of tapping the heat.

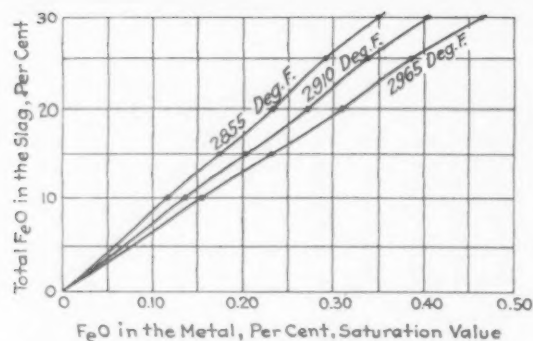
If the heat could be put into shape so that the period following the addition of spiegel alloy could be reduced to 18 or 20 min., this would result in checking the iron oxide at a lower level than that resulting from the 25-min. interval. This is shown clearly in the sketch.

### Seams as a Function of Iron Oxide

Measurement of seams developed in turning tests on axle steel, and plotting them against the iron oxide content of the steel was reported on by Dr. Herty, and shown in a simple diagram, such as that herewith. It is possible to get a low enough iron oxide content so that practically no seams will appear. This would be at 0.12 per cent iron oxide or less. As the iron oxide content increases it will be noted that the seams increase very much more rapidly.

Comparing the two processes of recarburizing the heat and catching the carbon as the heat comes down, it was shown that recarburized heats cut the chipping costs considerably. Rejections, however, were about the same in the two cases. It was found that an increase of about 150 deg. F. in the rolling temperature could be made to cut the chipping costs in half. In one case this came down from \$1 or \$1.25 to 50c. In any case, however, we must suit the heating practice to the steel and its carbon content.





Varying effect of FeO in the slag upon saturation of FeO in the metal, as influenced by temperature.

Two kinds of seams were reported. One is a straight line, indicating silicate inclusion. The other consists of small pockets in a line, showing sulphuric inclusions. To get a minimum of seams an effort is made to get somewhere between these two manifestations.

Warning was given not to leave the heat in the furnace too long after the furnace additions are made. If this is done much of the iron oxide will go back into the steel from the slag. At the same time, enough deoxidizing additions must be put in to hold the iron oxide down in the steel for a long time.

There is an irregularity in the steel analysis as between the recarburized product and the heat which is caught coming down. The recarburized steel gives better results in the analysis. On the other hand, there are better physical results and greater physical regularity to be obtained from the steel which is caught coming down.

#### High-Manganese Pig Iron for Deep Drawing

A question was asked whether pig iron with 1.75 to 2 per cent manganese is beneficial in the manufacture of mild steel for drawing purposes. One man stated that high-manganese pig iron gets into the question of slag conditions. An operating man stated that he can get better results from the steel if it has manganese in the limits specified, although there is a greater loss in production; in other words, a lower yield.

One man stated that the high manganese will result in getting a better sulphur elimination. The

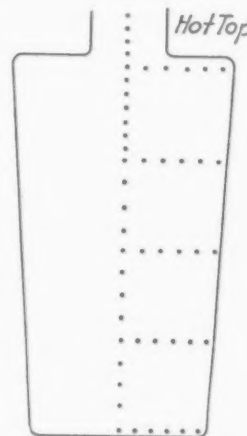
manganese in question gives him a residual of 0.25 per cent with 0.10 per cent carbon.

The foamy condition of a slag, sometimes attributed to high manganese, is controlled more, in the opinion of one speaker, by the condition of the slag at time of tapping than by the temperature of the metal. If the slag is right, and the temperature is also right, the heat should not form, and a lower sulphur content in the steel would be obtained.

Heats re-pigged with cold metal are not favored. One operating man stated that any heat that is to be re-pigged is not applied to an order calling for rigid specifications. Another man stated, however, that in such a case, if enough re-pig metal is used, and then some ore added to get a reaction, no trouble will result. Generally speaking, however, re-pig iron was stated to be detrimental to quality.

#### Tests for Homogeneity

Segregation tests were made on some ingots under the direction of Dr. Herty, and some further tests of a similar character, on rimming steel, will be reported upon for the next meeting. In the instance shown by diagram, the ingot was split open and then drilled as shown by the dots. A row of six holes was drilled across the top, beginning at the center and extended to the edge as shown. Similar rows were drilled at the bottom and three other rows at quarter lengths. Then between the two upper rows and as far into the hot top as practical, holes were drilled every 3 in. along the ingot axis. In the lower two-thirds of the length these holes were drilled every 6 in.



Illustrating splitting and sampling of an ingot, in studying segregation of metalloids.

Standardization on the method of splitting the ingot was strongly favored as one element in making such tests comparable as between different plants and different investigators. Similar standards in the drilling were favored for the same reason. If these two elements can be placed upon a definite basis, then much benefit can be had from comparison of the tests made.

#### ALLOY CONTAMINATION OF OPEN-HEARTH STEEL

Tonnage represented:

December-February	6,600,000
March-July	8,700,000
August-February	8,600,000

Average Results, in Percentage

	By Tonnage			By Plants			Worst Results in Period		
	1929-'30	1930	1930-'31	1929-'30	1930	1930-'31	1929-'30	1930	1930-'31
	Dec.-Feb.	March-July	Aug.-Feb.	Dec.-Feb.	March-July	Aug.-Feb.	Dec.-Feb.	March-July	Aug.-Feb.
Manganese	0.200	0.186	0.180	0.224	0.216	0.195	0.042	0.042	0.043
Chromium	0.014	0.019	0.017	0.030	0.033	0.025	0.080	0.127	0.080
Vanadium	0.002	0.009	0.005	0.002	0.009	0.005	0.003	0.015	0.007
Nickel	0.044	0.042	0.039	0.043	0.055	0.042	0.090 (a)	0.129 (a)	0.138 (a)
Copper	0.087	0.107	0.086	0.099	0.103	0.087	0.219	0.227 (a)	0.248 (a)
Tin	0.006	0.004	0.005	0.010	0.007	0.007	0.041 (a)	0.041 (a)	0.053 (a)

(a) In same plant.

# PIERCING A SOLID STEEL BAR IN MAKING SEAMLESS TUBES

**H**OW the action of crossed rolls opens up the interior of a plastic bar of hot steel and forms an embryo tube was told in detail in a paper read recently before the Western Metal Congress by Dr. F. N. Speller, of the National Tube Co. The extract from his paper here published gives the essential facts and explains much which is not everywhere appreciated.

**A**FTER the invention of the piercing mill several years were lost, so far as the development of the seamless process was concerned, due to the fact that the lap and butt-weld tubes then being produced met current requirements, and apparently there was no need for stronger and otherwise better tubes. About 1895, near the time of the invention by R. C. Stiefel of the disk piercing mill, a demand was evident from bicycle manufacturers for a tube of better quality than that produced by either the lap or the butt-weld process. It was this impetus that really brought about the first development of any consequence in the seamless process. This market was short lived, however, and the product was expensive.

While further development and improvements were somewhat slow, they have been steady. Today the seamless process of making tubes is displacing, in modern plants, the old lap-weld process, thus enabling manufacturers to meet the demand for a tube of both quality and properties far beyond those heretofore available.

For the production of pipe and tubing up to 6 $\frac{5}{8}$  in. outside diameter, both the Stiefel and the Mannesmann piercing mills are used. The Stiefel mill is not so popular as it once was, giving way to the sturdier and faster Mannesmann mill. In this range, all piercing is done by one mill. On sizes larger than 6 $\frac{5}{8}$  in. two piercing mills are used, one to produce a short, heavy-wall billet and the second to expand and elongate the tube and reduce the wall thickness. This latter method, double piercing, paved the way for manufacture of sizes larger than previously had been thought possible.

Whether a tube has been single-pierced by the Stiefel or the Mannesmann process or double-pierced,

the next step is a two-high or plug rolling mill, where the billet is reduced in both diameter and wall thickness. After comes the reeling operation and sizing.

## *Cross-Roll or Mannesmann Process*

**M**ANNESMANN machines for piercing round billets embody the principle of diagonal rolling, which at the time of its inception proved to be a somewhat startling innovation. This principle can be carried out in a number of different ways with rolls of different shapes. The rolls used in this machine are comparatively heavy. (Fig. 1.) They measure, over all, about 36 in., and, in the body or face, 24 in. in length, and from 32 to 40 in. in diameter.

These dimensions are varied according to the size of tube to be made. The roll shape resembles that of a piece cut from the middle of a very large spindle, with a flat portion about 1 in. long at the middle. From this flat part each roll tapers toward the end at an angle of from 5 to 10 deg. This angularity of the rolls is necessary to produce the play of forces required to effect the piercing and at the same time permit the billet to be drawn continuously through the mill.

These rolls may be made of steel or other material, and are made with necks like an ordinary roll; but they are provided with a type of universal joint instead of wobblers. When they are placed in their housings, they lie side by side instead of one above the other, and their axes are inclined, each at an angle of 6 to 12 deg, in opposite directions, so that the rolls cross each other at their centers. Upon the amount of this angle depends the speed with which the billet will be drawn through the mill. They can be adjusted laterally in their housings, and are set so that the distance between their rolling surfaces at the middle

is a definite amount less than the diameter of the billet to be pierced.

#### Operation of Piercing

Although the action of the rolls is far from being simple, the piercing is performed apparently with as much ease as any ordinary rolling process. A round billet of the proper length and diameter to make the size and length of tube desired is first centered on one end to a depth of about 1 in., and then heated uniformly to the usual temperatures for rolling light sections. A mandrel, or plug, with a pointed nose, tapered at the proper angle and known as the piercer point, is attached to a water-cooled rod designed for the purpose, and inserted between the rolls from the delivery side. Its pointed end just passes the line where the rolls cross.

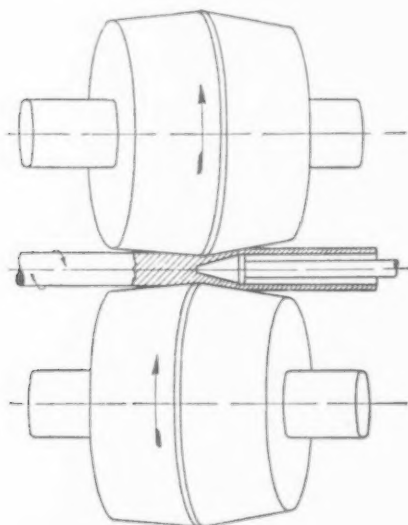


Fig. 1. Showing operation of the Mannesmann crossed rolls in opening up a solid billet and making a thick-walled, rough tube. The mandrel assists in keeping the hole central.

With the rolls revolving at a constant speed, the heated billet, lying in a trough, is now pushed, centered end first, into the space between the rolls by means of a rod actuated by a hydraulic or compressed-air cylinder. The rolls immediately grasp the billet, revolve it rapidly, and pull it slowly forward. At the same time they draw the metal away from the center to form a hole, elongate and enlarge this hole, and force the metal over the plug and rod. The latter, while they revolve in a thrust block bearing at the same rate as the billet, maintain the same relative position with respect to the rolls.

Less than a minute is required to perform this composite operation. When the billet issues from the mill, having been forced entirely over the mandrel or plug, it is in the form of a thick-walled tube, somewhat rough but fairly uniform in thickness.

The action of the rolls is somewhat difficult to understand and still more difficult to explain satisfactorily. It is evident that the forward motion of the billet is caused by the inclination of the axes of the rolls. How these two rolls, by exerting pressure only on the surface of the billet, are able to force the metal over the mandrel to form a tube from a solid billet is not so readily grasped. It is to be especially

noted that the mandrel is not forced through the metal, but that the rolls cause the metal to flow over and about the mandrel.

To bring about this result, the rolls must first draw metal away from the center of the billet, which action forms, or tends to form, a central hole, or cavity, for the passage of the mandrel or piercer. This is evident from the fact that a small, but somewhat irregular, hole may be formed in a billet without the use of the piercer point.

#### Principle Involved in Forming the Cavity

Indeed, such a hole can be opened up in the center of any solid cylindrically shaped plastic body by rolling it between, even, two flat surfaces. Steel workers, particularly hammermen, are familiar with the fact that, if a piece of steel in the form of a round bar is pressed or hammered into an oval form, several times in succession, a rupture will occur in the center that will extend longitudinally through the middle of the bar.

This rupture is formed because, when pressure sufficient to deform it is applied to the round bar at diametrically opposite points, making one diameter shorter and that at right angles to it longer, the spreading of the metal, which takes place along the long diameter and in opposite directions, sets up a lateral tension that may cause its particles to be drawn away from the center. (Fig. 2.)

#### Flow of the Metal in Piercing

This is the action that first occurs in the roll-piercing machine. As the billet, which is in a plastic state, enters the mill, the rolls grasp it at diametrically opposite points on its circumference while it is yet about 4 in. from their centers. As they draw the billet forward they continue to compress it at these opposite points, and, since they revolve it rapidly, these points are continually changing. In this way a small hole is quickly formed and is then rapidly enlarged. This enlargement is due to two things.

As the rolls are larger at their centers than at the ends of the points at which they first grasp the billet, the increasing peripheral speed tends to produce a twisting action on the outer surface of the billet between these two points. And, as their axes are inclined to the axis of the billet, they at the same time exert a forward pull upon the outer surface of the billet. The result of this double action is that the metal is forced to flow in a spiral path. Since the decrease in the diameter of the bar is not sufficient to compensate for this increase in length, metal must be withdrawn from the center to compensate for the deficiency.

This opening is further enlarged by the rolling-on process that occurs as the hollow part of the billet is forced over the mandrel, or plug. This rolling-on process increases the diameter, hence decreases the thickness of the wall. As already pointed out, it is the practice to place the piercer point a little beyond the centers of the rolls. This position is necessary, so that the billet may be forced entirely over the mandrel before it passes from between the rolls. Otherwise the piercer point would remain imbedded in the metal. In this position the piercer point prob-



ably does some work, but the action of the rolls is the main force in pulling the metal from the center.

Since the mandrel cannot be held to an exact center to start with, and it is desirable to start the rolling-on before the opening in the center is very large, the forward end of the billet is centered, to insure that the point of the mandrel will penetrate the billet at or very near its axis. At the end of the rolling, the mandrel bar is removed from the tube which encircles it, and the mandrel, which drops from its end, is plunged into water to cool. The process can then be immediately repeated by placing another cold mandrel on the bar.

### Stiefel or Disk Piercing

**I**N the Stiefel machine, the two actuating surfaces, which are of the same shape, have the form of large disks about 30 in. in diameter. (Fig. 3.) The rolling faces of these disks are beveled, or chamfered, at an angle of about  $7\frac{1}{2}$  deg., for a distance from the edge equal to nearly half the radius. These two disks are mounted on the ends of two shafts that lie in two parallel lines and extend from two points in opposite directions. The distance between center lines of the shafts is about two-thirds of the disk diameters.

In this way only sections of the two disks, corresponding to a little less than one-third of their diameters, face each other. These sections are the working surfaces of the disks and are separated by a space slightly less than the diameter of the billet to be pierced. Each shaft is connected through gears to a main driving shaft, propelled by a steam engine or electric motor, so that both disks are revolved in the same direction and at the same rate.

Between the disks and extending beyond the mill on both sides is a trough for supporting the billet during the piercing process. This trough is fixed in a position to cause the billet to enter the mill between the disks on a level a little below their centers of rotation, and along a line slightly inclined to the base plane of each.

### Operation and Action of the Mill

Like the Mannesmann machine, the operation of the Stiefel mill is very simple. The billet, which has been previously centered, is heated to a uniform forging temperature; the plug, or mandrel, supported on the end of a bar, is put in position between the disks

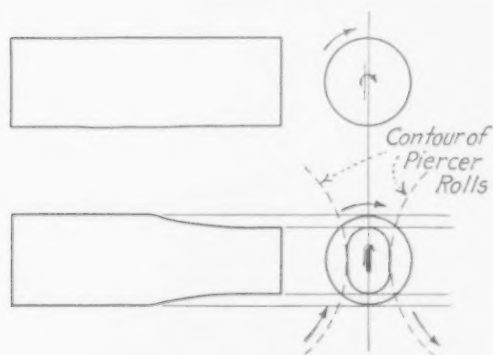


Fig. 2. Action of rotary piercing mill on internal structure of billet. A hole would be opened up, even without the mandrel point.

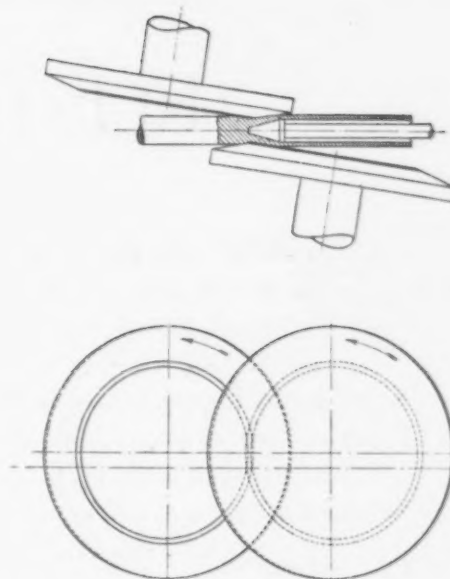


Fig. 3. Action of opening up a billet in the Stiefel type of mill, with the aid of a mandrel.

from the delivery side; and the billet is shoved into the mill from the opposite side by means of a mechanical pusher. Like the rolls of the Mannesmann mill, the disks grip the billet, revolve it rapidly, pull it forward, draw out the metal to make a hole in the center, and force the wall of the rough tube thus formed over the mandrel.

It is evident that the steel is subjected to considerable distortion in both these processes. Only billets of the best steel, absolutely sound and of uniform material, and heated to a uniform temperature throughout, can be used. With such material, these mills pierce billets as accurately as it can be done by any other method.

### Why Double Piercing Was Needed

Neither method, however, permits the speed of production desirable on larger sizes, and it is to be especially noted that the amount of metal displaced increases considerably as the size is increased. This deficiency led the National Tube Co. in 1924 to the development of the double-piercing process. This improvement consists essentially of a second piercing operation on the already hollow billet. The advantages are at once obvious. Instead of its being necessary to displace in one operation a large quantity of metal at a slow rate of speed, a small quantity can be displaced quite rapidly and later expanded.

Some idea of the decrease in displacement can be gained from a comparison of piercing practice by the single and double methods for producing pipe of  $10\frac{3}{4}$ -in. outside diameter and 0.365-in. wall. To produce a pierced billet by the single piercing process for this size would necessitate producing in one operation a hollow billet of approximately 10 to  $10\frac{1}{4}$  in. inside diameter. The same size produced by the double piercing method necessitates piercing a billet with an inside diameter of only 5 to  $5\frac{1}{4}$  in. It is obvious that this difference in displacement in forming the inside diameter of the tube is much more readily accomplished in this manner than by the single piercing method.

# RUSTLESS STEELS—THEIR

**C**HROME-NICKEL steel in the 18 and 8 ratio in certain temperature ranges is subject to embrittlement and precipitation of carbides, with general weakening of its corrosion-resistant properties in certain corrosive solutions. It is assumed that the formation of carbides is accompanied by impoverishment of chromium near the grain boundaries. The author, whose paper before the May meeting of the American Iron and Steel Institute is here abstracted, believes that the disadvantages mentioned may be overcome by varying the ratio of chromium to nickel to suit the service to which the alloy will be put.

**W**ITHIN the extensive group of rustless steel alloys we have a variety of materials differing substantially in chemical analysis, varying widely in physical properties and acting very differently in the field of corrosion resistance; yet it is all too common to refer to this group as "stainless" or "rustless" iron or steel.

This paper will deal with several of these alloys; therefore, may I state that I regard materials containing less than 16 per cent chromium with variable carbon as corrosion-resistant stainless steels; materials with less than 0.10 per cent carbon and over 16 per cent chromium as chromium irons; and materials containing nickel together with chromium as either iron-nickel-chromium corrosion-resistant alloys or iron-chromium-nickel corrosion-resistant alloys, taking their terminology from the chemical analysis, using chromium-nickel where chromium predominates and nickel-chromium where nickel predominates.

There is, of course, another type of material which, if anything, antedated stainless steel. I refer, of course, to the material containing carbon from 1 to 2 per cent, with chromium of approximately 16 to 24 per cent, which was used extensively for drawing dies and is regarded generally as a tool steel. One should not lose sight, however, of the fact that this material is a highly corrosion-resistant alloy, and in many cases, where extreme hardness is desired and the corrosive conditions are not particularly severe, can be used to distinct advantage.

## Low-Carbon High-Chromium Types

Inasmuch as it is impossible to obtain the maximum corrosion resistance from the stainless steel containing 12 to 14 per cent chromium without heat treatment, resort was made to the low-carbon higher chromium materials

1.—Because they did not harden (appreciably) on quenching either in air or water.

2.—Because the higher chromium content seemed to substantially negate the effect of free carbides, thus producing a higher degree of corrosion resistance.

And it is this type of alloy the author feels is justly entitled to the term "chromium iron." Physical properties are given in one of the tables.

The tables clearly show that the material in the "as rolled" condition possesses its highest physical properties, which are in proportion to the amount of mechanical work done upon it; whereas heat treatment in no case materially increases these physical properties but reduces them to a common unit which practically remains unchanged; naturally, elevated temperatures produce enlarged grain and subsequent weakness.

The embrittlement produced in the straight chromium alloys when submitted to elevated temperatures, and the grain growth produced in welding, combined to some extent with the restricted low-temperature working ranges for fabrication of the straight chromium alloys, were all features which left the trade very willing and glad to welcome the entrée of the chrome-nickel alloys of the Strauss and Johnson type. Their rapid adoption within the last few years has been remarkable. There is not the slightest doubt

## STAINLESS IRON OR STEEL (?) ANALYSIS

	Per Cent
Carbon .....	0.07
Manganese .....	0.12
Silicon .....	0.08
Chromium .....	11.70
Nickel .....	0.57

## Treatment: Oil-hardened from 1700 deg. F. and reheated as shown

Reheating Temp. Deg. F.	E. L.	Ultimate	Elong.	Red. Impact	Izod	Brinell
400	.....	163,500	12	38	34	340
575	.....	162,200	12	36	38	332
750	.....	162,200	15	51	38	332
925	131,700	162,200	18	52	36	340
1100	85,100	109,700	22	62	65	241
1300	68,500	90,500	26	66	79	196
1400	62,700	81,500	31	69	87	179

# FABRICATION AND USE

By T. HOLLAND NELSON

Consulting Metallurgist  
Midvale Co., Philadelphia

that these materials possess many advantages and will be far-reaching in their general application.

However, the last ten years have demonstrated very effectively the ability of the simple chrome alloys to withstand many and various conditions of corrosion in the process industries and the author feels that they will continue to serve in many fields despite the tendency to suggest that they will pass by in favor of some of the more modern chrome-nickel alloys.

One of the most popular of these alloys is the familiar 18 and 8, as follows:

ANALYSIS	Per Cent
Carbon .....	0.15
Manganese .....	0.30 to 0.50
Silicon .....	0.30 to 0.50
Chromium .....	17.00 to 19.00
Nickel .....	7.00 to 9.00
Phosphorus and sulphur.....	low
PHYSICAL PROPERTIES	
Tensile strength, lb. per sq. in.....	85,000 to 90,000
Yield point, lb. per sq. in.....	30,000 to 40,000
Elongation, per cent.....	40 to 50
Reduction of area, per cent.....	60 to 70

To this analysis additions of molybdenum and tungsten are often made. It is claimed for molybdenum that the corrosive resistance of the material is substantially increased by a content of 2.50 to 3.50 per cent molybdenum. Addition of tungsten undoubtedly increases the physical properties and is of distinct value in this direction, particularly where the material is used under such conditions that corrosion and erosion are both of serious importance, or where strength at elevated temperature is required.

This type of material is considered to be austenitic, non-magnetic and fully corrosion-resistant in all instances where the straight chromium alloys fail. It

also possesses physical properties, particularly high impact values, which warrant its adoption for cases where this lack of impact value in the chromium alloys is a disadvantage.

However, experience is gradually impressing upon us that, despite the advantages that this type of material undoubtedly has in some instances over the straight chromium material, it is by no means free from some disadvantages also. Whereas with the straight chromium materials we had embrittlement after continued soaking in certain temperature ranges, we find that the chrome-nickel alloys, in a slightly different range of temperatures, have a tendency to undergo a definite change with some embrittling and the precipitation of carbides, with general weakening of its corrosion-resistant properties in certain corrosive solutions, when this phenomenon is present.

Further, whereas the material welds very satisfactorily in contradistinction to the straight chromium materials, the heat gradient away from the weld obviously has an area in it which corresponds to the temperature zone in which carbides will precipitate and resistance to corrosion is thereby weakened.

## Problem of Carbide Precipitation

Let us look a little closer into this question of carbide precipitation. In the first place, such an occurrence shows clearly that this particular combination of chromium and nickel in iron is by no means stable and require under certain conditions very little to disturb it, in which case its natural tendency is to revert to its stable condition, which would be a ferritic or alpha iron condition. Coincident with this carbide formation it is generally assumed, and I believe correctly so, that in the formation of chromium carbide, with the chromium content of from 50 to 60 per cent, the material immediately adjacent to the grain boundaries is impoverished of chromium.

Being thus impoverished it not only is reduced in chromium content below the point necessary to maintain the corrosion resistance, but at the same time it is reasonable to assume that this film or area slips into the alpha iron condition, as evidenced by magnetism, and we have a problem which, to say the least, is complex inasmuch as we have carbides of iron, carbides of chromium, chrome-nickel of one content in alpha iron and chrome-nickel of another content in

## MILD STAINLESS STEEL ANALYSIS

	Per Cent
Carbon .....	0.15
Silicon .....	0.09
Manganese .....	0.16
Chromium .....	11.80
Nickel .....	0.77

Treatment: Oil-hardened from 1700 deg. F. and reheated  
as shown

Reheating Temp. Deg. F.	E. L.	Ultimate	Elong.	Red.	Izod Impact	Brinell
925 .....		199,360	10.0	36.0	16	402
1100	94,080	225,440	20.0	52.2	35	255
1300	85,120	103,040	26.0	58.1	60	223
1400	69,440	96,328	28.0	61.5	68	207



gamma iron. With these various phases before us it is not difficult to foresee that trouble may readily occur under corrosive conditions.

It is obvious that, in the various processes involved in the fabrication of chemical structures, material has to be hot-worked and the critical temperature ranges, herein referred to, have to be negotiated. Serious consideration must be given to this matter by both the fabricator and the ultimate user, in so far as it may have a direct bearing on his particular problem.

#### Satisfactory Welded Structures

The fabricator's only hope in producing really satisfactory structures of welded design for extremely drastic corrosive conditions lies in one of the following possibilities:

- 1.—That carbide precipitation does not take place to such a serious extent that the particular corrosive solution he intends to handle will attack this area seriously.
- 2.—That if his corrosion solution be such that these areas would be attacked, then he might hope with heat treatment at temperatures not exceeding 1700 deg. F. sufficiently to restore the austenitic structure to offer satisfactory resistance to corrosion.
- 3.—And to the author's mind what is much more logical—to obtain, if possible, an alloy in which the tendency to precipitate carbides and allow transformation from the gamma to the alpha iron condition does not exist, or, if it does exist, is sufficiently retarded to be less serious than that of the straight 18 and 8 types.

#### Increase in Nickel Content Suggested

An increase of the nickel content would appear to be all that is required and, so far as stabilizing the austenitic condition and retarding the carbide precipitation with its inherent difficulties is concerned, this can be substantially accomplished. However, as we found in the study of the straight chromium-iron alloys that varying percentages of chromium were required to meet different corrosive solutions, so do we find also with the chromium-nickel series that we can rearrange alloy contents to produce certain metallurgical conditions, but the ideal metallurgical condition is not necessarily indicative that the material will withstand a particular type of corrosive attack.

At this point it would probably be as well to examine the behavior of iron, nickel and chromium as pure metals and their respective reactions in the presence of nitric, hydrochloric and sulphuric acids:

Metal	HNO <sub>3</sub> Sp. Gr. 1.20	HCL (Conc.)	H <sub>2</sub> SO <sub>4</sub> 10 Per Cent
Iron .....	0.7165	0.0814	0.0327
Nickel .....	0.1546	0.0037	0.0002
Chromium .....	0.0006	0.2014	0.0014

The loss is stated in grams per square centimeter for a period of 24 hr.

These figures give a distinct indication as to what one might expect by using nickel or chromium alloyed with iron.

#### Addendum

IT has been pointed out to me that I have left the inference that, when the alpha and gamma iron phases are represented together in chrome-nickel alloys, trouble will be experienced, and while there is

#### STAINLESS STEEL (Cutlery Type) ANALYSIS

	Per Cent
Carbon .....	0.35 to 0.45
Manganese .....	0.15
Silicon .....	0.19
Chromium .....	12.00
Nickel .....	0.55

Treatment: Air-hardened from 1700 deg. F. and reheated as shown

Reheating Temp. Deg. F.	E. L.	Ultimate	Elong.	Red.	Izod Impact	Brinell
925 .....		232,900	9	24	8	444
1100 .....	126,300	141,100	15	42	15	285
1300 .....	104,800	120,900	21	52	30	241

This material air-hardens from hot-working temperatures and should be annealed or tempered, if any machining and any degree of toughness is necessary. This material is not usually obtainable in plates, shapes, etc., for structural purposes.

▲ ▲ ▲

considerable evidence that this is true of the 18 and 8 types of alloys, I am aware that there are other ratios of chrome and nickel where the alpha and gamma phases may be represented, which behave remarkably well under corrosive conditions.

With the extremely low-carbon, 18 and 8 type materials, it is rather difficult to conceive that the precipitated carbides are sufficient to account for some of the corrosive attack. It is, however, quite conceivable that the lower the carbon content, the less stable is the 18 and 8 combination and that either under stress or at certain temperature ranges, transformation might readily take place.

On the other hand, with higher carbons, though the austenite may be a little more stable, nevertheless with the precipitation of carbides in substantial quantities we get not only alpha and gamma phased condition, but also chrome impoverishment.

#### Five Points Emphasized

The points I particularly wish to stress are:

1.—The percentage of alloy addition to iron is always likely to be a variable factor governed by the corrosive solution and the temperature cycle.

2.—Experience over the last 15 years points very clearly to the use of nickel with iron for resisting certain types of corrosion and of chromium with iron to resist other types of corrosion.

3.—It is hoped that some of the results given in this paper establish fairly clearly that, where nickel is the element capable of imparting either partial or entire passivity to a certain balance of iron, chromium can be added in some cases, so long as it does not exceed the nickel content, without impairing its value and sometimes definitely improving it.

4.—In reverse ratio it is hoped that this paper has shown that, where chromium is the alloy capable of imparting partial or complete passivity, there are cases where nickel can be added so long as it does not exceed the chromium content, without disadvantage and in many cases with decided advantage. With a better knowledge of these facts, we may look forward to a wider application of corrosion-resistant alloys and by suitable arrangement of alloy content, to the production of materials with physical properties not previously thought possible.

5.—With the exception of silicon, the author feels

that insufficient is known as to the behavior of some of the other elements which are being from time to time added in smaller quantities to these alloys to make definite claims regarding their functions in the field of corrosion resistance. They have, however, a very definite field in the modification of the physical properties.

#### Discussion by Dr. F. M. Becket\*

**M**R. NELSON'S experience has presented exceptional opportunities to correlate the properties of corrosion-resisting steels in the hands of the fabricator and in final service.

The extensive literature that has appeared in our own and other languages dealing with steels of this type has rendered quite difficult the task of presenting an instructive article treating of all the corrosion-resisting steels without employing well established data. Despite this handicap, Mr. Nelson has brought out convincingly through use of practical examples the points he desired most to emphasize.

#### Standard Terminology

The vigorous plea of the author for a standardized terminology should incite action. For further emphasis I should like to refer to only one of the many needs for improvement. Since the introduction about ten years ago of the steels containing 12 to 14 per cent chromium and 0.10 per cent carbon, slightly more or less, generally termed "rustless" or "stainless" irons, more than a dozen authors have painstakingly explained that such products are steels, not irons; and more than one prominent author has felt it necessary to repeat his explanation.

Again, within the past month a most eminent metallurgist deplored and explained the error of apply-

ing the term "iron" to the class of steels just mentioned. Producers quite properly wish to preserve their trade designations; nevertheless, I believe that clarification in the nomenclature of generic terms could now be accomplished without disturbance of the manufacturers' interests, and from time to time thereafter a more detailed terminology developed.

The author draws attention to the low impact values of the low-carbon, 18 per cent chromium steels, as determined by the notched bar Izod and Charpy tests. Admittedly the low-carbon steels containing much over 20 per cent chromium give low impact values under these tests, although they possess considerable ductility if rapidly cooled through the temperature range 600 to 400 deg. C. This has often been demonstrated by completely flattening seamless tubes containing 25 to 27 per cent chromium without cracking, and by bending plate through 180 deg. without breaking. However, in justice to 18 per cent chromium steel, it should be stated that notched bar Izod values of from 40 to 50 ft.-lb. can regularly be attained, and that well over 80 ft.-lb. has been reached. Of course, such values represent a toughness ample for most purposes.

Apparently the author finds little if any merit in the commercial welding of the high-chromium steels. However, considerable equipment has been welded from high-chromium steel plate and for years this has withstood the attack of strong acids to the entire satisfaction of the users. Welds properly made and suitably annealed produce tubing which can be drastically cold drawn with complete success. Although it is not advisable under some conditions to use welded joints in thick plate that must withstand severe corrodents at high pressure, strong and ductile welds can nevertheless be dependably produced in these steels.

#### Nickel and Intercrystalline Corrosion

The deterioration that occurs in the austenitic chromium-nickel steels associated with changes at or near the grain boundaries results in one or both of two evils—intercrystalline corrosion and loss of ductility. The author treats the first of these at some length and thereby enters a broad field, not all parts of which have been thoroughly explored. His view is the one most generally accepted by recent writers—that precipitation of carbides at the grain boundaries initiates the trouble, and impoverishment in chromium near the boundaries seems likely to follow.

Whatever the exact mechanism, our experimental evidence does not yet permit acceptance of the view that changes up or down in the chromium-nickel ratio overcome intercrystalline corrosion. Much work has been done on a series of low-carbon chromium-nickel steels containing from 12 to 23 per cent chromium and 5 to 25 per cent nickel. In some instances the nickel content considerably exceeded the chromium. The results have shown that in every case in which the steel was fully austenitic, intercrystalline corrosion could be induced. Therefore, immunity can not yet be foreseen through acceptance of either suggestion of the author—the one recommending an increase in chromium adequate to inhibit impoverishment in that

#### PHYSICAL PROPERTIES OF LOW-CARBON CHROMIUM IRON

##### ANALYSIS

	Per Cent
Carbon	0.09
Manganese	0.35
Silicon	1.28
Chromium	18.50

##### Size 13/16 in. in diameter

Treatment	E. L.	Ultimate	Elong.	R. A.	Brinell
As rolled, deg. F.	77,000	95,000	27.0	67.0	197
100	79,000	97,300	27.0	65.9	196
500	77,000	98,000	27.0	67.0	207
725	76,400	97,200	27.0	63.3	212
1000	81,500	99,800	26.0	64.0	207
1250	78,300	96,000	26.5	63.6	207
1500	52,400	78,400	36.0	73.5	156
1750	56,900	79,900	31.0	68.2	167

##### Same Material Water-Quenched from 1800 deg. F. and Reheated as Shown

Treatment	E. L.	Ultimate	Elong.	R. A.	Brinell
As quenched deg. F.	55,000	77,300	36.5	70.4	156
100	56,400	76,900	33.0	73.5	156
500	56,900	77,900	36.0	71.5	156
700	54,900	74,900	35.0	72.9	152
1000	57,400	83,400	31.0	65.9	159
1250	50,000	76,000	35.5	71.4	156
1500	50,900	74,900	36.5	76.5	146
1750	50,000	76,000	36.0	71.4	179

element; the other to increase the nickel sufficiently to stabilize the austenitic condition.

#### Discussion by Charles Morris Johnson\*

THE subject of terminology, to which could be added "applications," might well be made the study of a joint committee, with members appointed from the American Iron and Steel Institute, the American Society for Steel Treating, the American Society for Testing Materials and the American Chemical Society.

#### Simple Chrome Alloys

The "simple chrome alloys" have established their permanent value for the cheaper rust-resistant applications. They have been found of much value in certain mine waters for pumping engine parts where the use of the more expensive chromium nickels, such as 18 and 8, are not attractive on account of higher first cost. Monypenny cites many permanent applications in locomotive parts and hydraulic rams. There are also bright trim possibilities for automobiles in the 14 to 18 per cent plain chrome irons for cheaper cars, and roofing.

#### Magnetic Susceptibility and Precipitation of Carbides

Mr. Nelson refers to the increased magnetic susceptibility in the 18 and 8 steel when it is held for a time at 1200 to 1300 deg. F. The writer pointed out this fact 11 years ago in his paper read before the Philadelphia convention of the A. S. S. T., entitled, "Properties and Microstructure of Heat Treated, Non-Magnetic, Flame, Acid and Rust-Resisting Steels," August, 1920. This paper was published in the *Transactions* of the society July, 1921. Therein it was shown that No. 2 Rezistal, which is essentially the same analysis as 18 and 8, except for the higher silicon range of 2 to 3 per cent, became magnetic on holding it at 1300 deg. F. and lost its magnetism by reheating to 1600 deg. F. and cooling in air or quenching in water; having lost its magnetism, it can then be turned to the magnetic state again after 10 min. heating at 1200 deg. F. It was, at the same time, also pointed out that cold-drawing increased the magnetic susceptibility and this susceptibility was removed by heating to 1900 deg. F. This was long in advance of a commercial production of these steels in this country.

"As to intergranular corrosion being associated with increased magnetic susceptibility, it has been our experience that the mere presence of alpha or delta iron is by no means indication that the steels are always subject to the intergranular attack. Some of the most resistant steels, in our experiments, are very definitely magnetic." (Dr. J. A. Mathews.) The richer a resistant steel is in carbide content, the more it is attacked, as a rule, by hot acid solutions. The same is true when the corroding medium is a molten non-ferrous metal, in some instances, at least; and probably in a majority of them.

The author's hope that an alloy steel of the resistant type will be produced that will be sufficiently immune to intergranular attack or entirely free from

the effects of carbide precipitation, seems in a fair way to being realized.

"As a result of experiments that the Crucible Steel company has made, we find a number of modifications of 18 and 8 which cannot be embrittled by long or short annealing within the customary range of from 1100 to 1300 deg. F. even after 300 hr. boiling in copper sulphate sulphuric acid." (Dr. Mathews.)

In applying such new steels, service tests should guide in their final adoption, as impurities may exist in the particular application that cannot be duplicated with certainty in the laboratory.

In the writer's experience, for example, a resistant steel gave valuable service for a year as a tank in which sheet steel was pickled in hot sulphuric acid plus certain salts. The same steel became soft and dead as a piece of cardboard in a few days when subjected to hot sulphuric acid rich in ferric salts. This was in a continuous pickling operation. The application of another type of steel gave fine results in both locations.

Keeping in mind these factors, the writer has developed a steel that is giving encouraging results in some field tests and in numerous laboratory experiments.

This alloy steel can be designated as "L" grade. A gas-welded annealed tank of "L," 4½ ft. wide by 4 ft. deep x 12 ft. long, has been in practical service in pickling billets in hot sulphuric acid since Jan. 8. It is a liner for an old wooden tank. There are no signs of failure of welds or noticeable attack at any location in the walls. This steel ranks first among a number of resistant steels that are high in resistance to fuming 97 per cent nitric acid at 145 deg. F. The carbon range is quite advantageous, as it is set at 0.22 per cent maximum, which is a very sensitive range in the 18 and 8 steels.

#### Effect of Nickel in Nitric Acid Corrosion

The author's statement that "in nitric acid, however, nickel plays no very important part in either accelerating or retarding corrosion," is, of course, true in weak solutions of nitric acid. However, if boiling concentrated nitric acid is the attacking acid and the alloy be as high as 25 per cent nickel with 18 per cent chromium, then the steel will fail. On the other hand, if the nickel be omitted and the steel is 18 per cent chrome, it will pass this drastic test, as the author no doubt is fully aware. In the 24 per cent chromium steel with 10 per cent nickel, the very high chromium will tend to offset the effect of the lower nickel content. The function of nickel in nitric resistant steels is to secure better welds and freedom from brittleness and grain growth.



\*Chief chemist, Park Works, Crucible Steel Co. of America.



## Redesigned Single-Crank Presses Increase Heavy Stamping Output

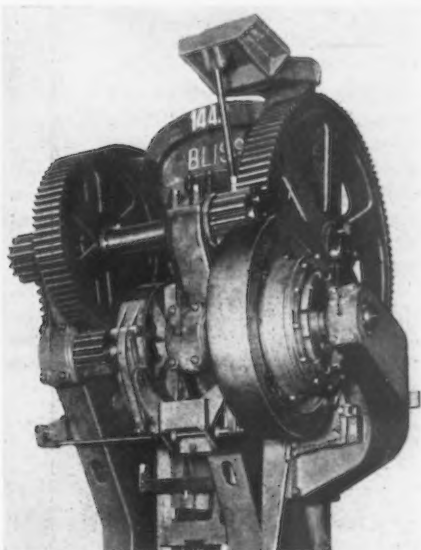
**L**ARGE single-crank presses manufactured by E. W. Bliss Co., Fifty-third Street and Second Avenue, Brooklyn, N. Y., have been redesigned to secure improved performance in the production of heavy stampings used in modern automotive construction. These presses are of heavy construction with double-gear twin drive equipped with a semi-automatic, multiple-disk friction clutch.

Designed for maximum stiffness, the bed has vertical webs in line with

justment, is used. Increased strength is emphasized for the adjustment locking device which does not require a split connection strap or body. Instead, a steel nut, split above its flange, is flanged to the strap. The halves are drawn together by four tangent bolts with nuts at the front. The high carbon, heat treated adjusting screw carries a bevel gear from which a train of spur gears leads to a motor, bracketed to the back of the wrist. No universal joints, belts or sliding splines are required, it is pointed out.

Other features include an unusually long slide guide, improved bracing, a well-seated wrist, and heavy, broad-faced gibs. All gearing is of steel with 20 deg. teeth and long addendum teeth on the pinions, designed for long wear and quiet operation. Heat treated, forged steel pinions are used. The wheels are high grade steel castings with well supported rims and H-section arms.

Timken roller bearings are used on the three-bearing drive shaft shown in the rear view illustration herewith. The balanced brake, to the right of

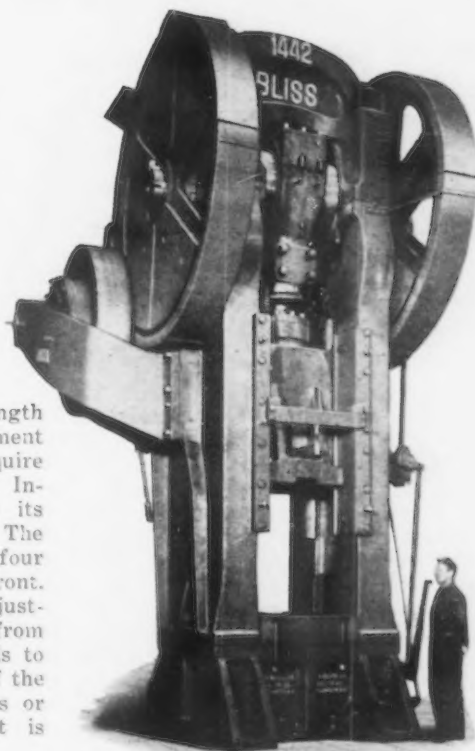


The Timken-equipped drive shaft with brake, clutch and flywheel may be seen in this rear view. Steel gears are used throughout.

the tie rods. The nuts of the latter are seated at the level of the feet to avoid the use of nut pockets. The back brackets are cast integral with the housings which have been enlarged and provided with broader seats at both ends.

The crown, a massive I-section arch with braced tie rod lugs, carries a 0.40 per cent carbon forged steel crankshaft, heat treated to a hardness that will just permit finish machining. Harder journals and crank-pin also improve the wearing qualities. The bearings have renewable liners of cast iron or bronze. Full eccentric, semi-eccentric or cheeked-crank type crankshafts are furnished, depending upon the length of stroke required.

A new (patented) type of connection, with a motor-driven screw ad-



Motor-driven screw adjustment for the connection piece is a feature.

the pinion, and the clutch and flywheel, between the next two bearings, are both standard elements in many Bliss presses. A Bliss control unit on the right-hand housing just below the main gear operates the clutch. This unit is cocked by a connecting rod from the main shaft and, when tripped by the treadle, engages the clutch. At top stroke the control unit unclutches and sets the brake.

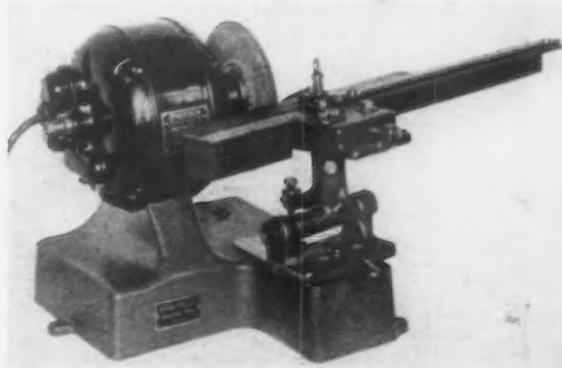
## Grinder for Power Hack Saw Blades

**F**OR sharpening power hack saw blades, especially those of high speed steel, the Wells Mfg. Co., Box 613, Greenfield, Mass., is offering the machine here pictured. This grinder will sharpen blades any width, any length and any number of teeth from 14 to four to the inch. Rapid operation is a feature.

The blade to be sharpened is rocked to and from the emery wheel. The

machine can be adjusted to sharpen alternate teeth at opposite angles which gives the saw a free cutting action and the effect of a set in the teeth. It is semi-automatic, each motion of the rocking arm moving the blade to a new cut. The machine is equipped with a ¼-hp. motor, two wheels, for fine and coarse tooth saws, and one diamond for truing the emery wheel.

**H**ACK SAW blades are reconditioned by this semi-automatic grinder that will sharpen alternate teeth at opposite angles.



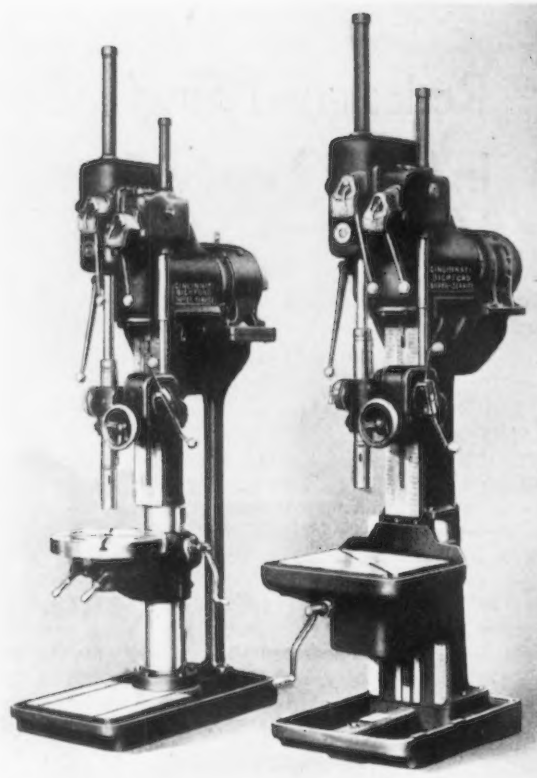
## Drill Has 12 Speeds Controlled by One Lever

NEW 21 and 24-in. "Super Service" upright drills built in either the round or box column construction, as illustrated, have been brought out by the Cincinnati Bickford Tool Co., Oakley, Cincinnati. They may be equipped for either general or single-purpose work and used as single units or combined into gang drills of either high base or low base type.

Twelve spindle speeds are obtainable by a single lever through selective sliding gears of heat-treated chrome-nickel steel mounted on shafts having integral multiple keys. Nine rates of speed, also controlled by one lever, are provided; the selective feed gears are of heat-treated alloy steel with broached integral keys. No belts or key feed mechanisms are incorporated in the design of these machines. Ball and roller bearing construction is featured and all mechanism is automatically flooded with oil.

Other features include proper counterbalance and full inclosure of the sliding head. The drop worm of feed engagement is replaced by a constant mesh worm, dipping in oil. Engagement of the feed is by means of either of the two pilot levers which control the advance and return of the spindle.

THESE 12-speed drills may be used as single units, as shown here, or they may be combined into gang drills of either high base or low base type.



A sidewise movement of either of these levers causes the engagement of a feed clutch of the same type as that used on the company's radial drills. Safety trips automatically disengage the feed at the top and bottom limits of travel, and there is an adjustable trip that may be set for the required depth.

Driving clutches are inclosed in drum housings; they are ball-bearing equipped and lubricated by oil flooding. The forward and reversing

clutches are actuated through internal expanding rings of heat-treated bronze. These rings operate within hardened steel cups integral with the driving bevel gears. Operating at a constant speed, the driving clutches are described as providing maximum power at all spindle speeds.

The direct-connected, 3 or 5-hp. driving motor is mounted close to the driving head where it is out of the way and protected from dirt and chips.

## Turret Attachment for Cincinnati Lathes

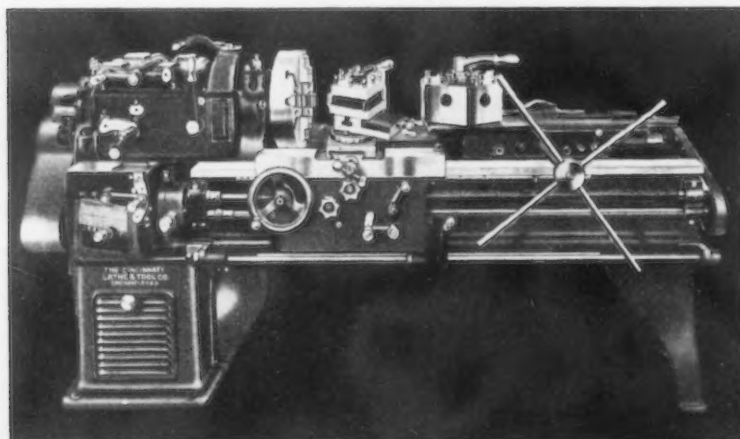
HEXAGON bed turrets are now obtainable for line of lathes (16-32 in. swing) built by the Cincinnati Lathe & Tool Co., Oakley, Cincinnati. The 20-in. lathe illustrated is

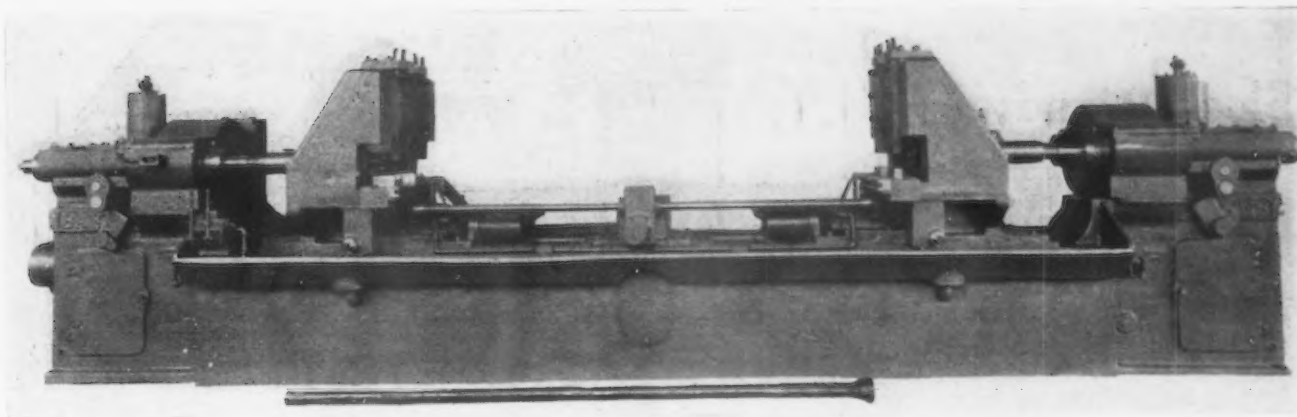
equipped with this attachment as well as with a square tool block in the compound rest and a four-jaw independent chuck. The machine is arranged for power feed and is driven

by a motor mounted inside of the cabinet leg.

The turrets are of automatic revolving type and are furnished with automatic independent feed stop for each face. Either hand or power feed can be arranged. Drive for the power feed is from a pulley on the rear end of the feed rod to another rod at the back of the bed. Automatic disengagement of the power feed within a reasonable degree of accuracy is obtained by a trip mechanism; this is supplemented by a positive stop which enables parts to be finished to length within 0.001 in. A lever on the slide permits the turret to be indexed to any position without returning the slide to the extreme end of its stroke.

The four-way tool block permits a number of different operations without changing tools. Three indexing positions for each tool. A simple angle-plate fixture for bolting to the faceplate to assure accurate boring has also been designed. With this, the boring bar as held in the turret is piloted into a bush in the spindle.





## Duplex Machine Faces and Threads Cast Iron Pipe

**F**OR facing, boring, threading and tapping cast iron pipe, a cam-feed duplex machine, designated as the No. 3, is being announced by Baker Brothers, Inc., Toledo, Ohio. The set-up here shown is arranged for 9-ft. lengths of pipe having a 2½-in. diameter thread. Pipe with 2 and 3-in. diameter threads and 6-ft. lengths also can be handled.

Operation is continuous, one length of pipe being completed with each machine cycle. Work is started by the operator who rolls a length of pipe on to a carrier and under the first station of the machine. There the

pipe is automatically raised and gripped by air-operated jaws that fit over a hexagonal section near the ends of the pipe. On starting the machine, the cam mechanism actuates the proper tool movements. At the first station these include rapid advance to the work, dwell for facing and the proper feed for boring at one end of the pipe and turning at the other.

At this point the jaws release, the operator places a new length of pipe in the carrier, and the previous piece is rolled to the second or threading position where it is again raised and

gripped by jaws. Positive lead for the tapping and threading tools is provided by cams. As collapsing taps and dies are used, reverse of the spindle is not required.

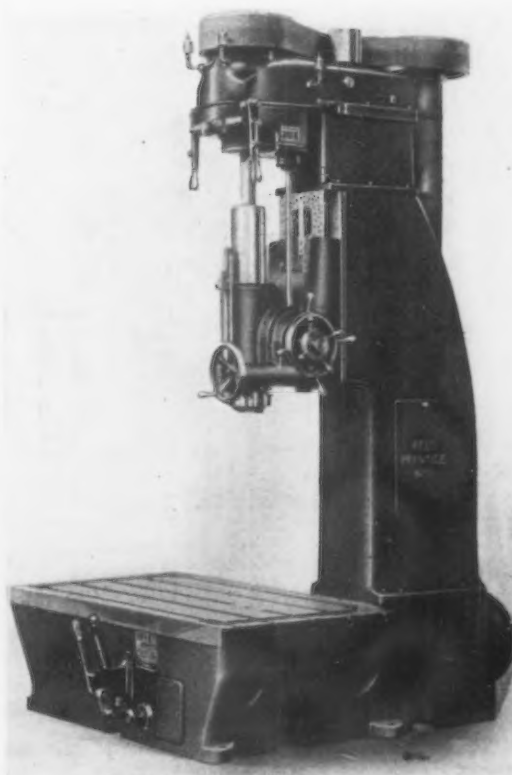
Spindle speeds for tools of various diameters are obtained through change gears. Cutting speeds recommended are 60 ft. per min. for the boring and turning operations and from 30 to 35 ft. per min. for tapping and threading. The only change necessary to handle pipe of different lengths is adjustment of the driving bars so that they are supported near the work to assure proper alignment and rigidity.

The machine, started by a push button, stops automatically after withdrawing the tools upon the completion of one entire cycle. The machine illustrated is about 17½ ft. long overall and weighs approximately 23,000 lb.

## Special Jig Boring Machine

**T**HE special vertical jig boring machine illustrated was recently completed by the Reed-Prentice Corpn., Worcester, Mass., for a large electric manufacturing company, and will be used for boring the top and bottom sections of cast iron sub-presses on which punches and dies are to be mounted for blanking and piercing laminations. Accuracy is required for boring the four pilot pin holes in order to give maximum life to the die. By the use of hardened steel pins in cast-iron holes, allowing at the start for a driving fit, it has been found that the required accuracy and durability are obtained.

The 15-in. power feed of spindle is arranged to feed 0.005, 0.010 and 0.020 in. per spindle revolution. Spindle travel accuracy is within limits of plus or minus 0.00025 in. in 15 in. The throat depth is 20 in., the distance of spindle to table is 39 in., maximum. Timken bearings are used throughout the machine.



**T**HIS special machine was designed for accurate boring of the four pilot pin holes in the top and bottom sections of cast iron sub-presses used in the blanking and piercing of electric motor laminations. Punches and dies used in these operations are exactly located by means of steel pins driven into the pilot holes.



## Blocking and Bundling or Briquetting Presses for Metal Scrap



THESE highly compressed blocks were produced by the press illustrated on the opposite page. Block No. 1, of new sheet steel scrap, was successfully rolled into bars and sheets after heating to welding temperature but without re-melting.

▲ ▲ ▲

TRIPLE-ACTING hydraulic presses brought out by Lindemann & Schnitzler, Düsseldorf, Germany, for compressing metal scrap prior to charging in open-hearth furnaces, are shown in the accompanying illustrations. Loose stampings, turnings and similar forms of scrap are difficult to handle and, in charging the furnace with such material, more frequent opening of the furnace doors is required with resulting loss of heat. These drawbacks are avoided if bundling or briquetting presses are used.

Scrap to be bundled may be loaded by magnet crane into the feeding hopper of the press. This hopper, tilted by hydraulic power, deposits the scrap into a large press box, which is 8 ft. long, 6½ ft. wide and 2 ft. 8 in. deep. Even distribution of the scrap in the compression chamber is assured by the hopper method of loading. When the press box is filled, the pile of scrap projecting out of the

box is forced down by the hydraulically-operated lid, which enters the box for about 8 in. The edges of the box and lid are sharpened to shear off projecting pieces of scrap which might interfere with the closing of the lid.

As soon as the lid is down, the second compression action takes place in the movement of the long-stroke horizontal low-pressure ram. The bundling is completed by the advance of a high-pressure ram which also moves horizontally but at right angles to the low pressure ram. As soon as the maximum pressure, approximately 4300 lb. per sq. in., is attained by the high-pressure ram, the pressure is cut off automatically. The pressure is supplied by a specially designed multi-stage, electrically-driven pump.

When compression is completed, a door at the side of the press opposite the high-pressure ram opens, permitting the bundle to be ejected auto-

matically. This action is also under control of the operator at the central valve station, where the water is admitted to the various hydraulic cylinders. By turning this wheel in one direction the press will execute the various compressing operations in proper sequence. A special indicator near the operator shows at a glance the exact position of any of the press rams. It is possible to cause the rams to advance rapidly at the start of the stroke and to reduce the speed with the increasing density of the bundle.

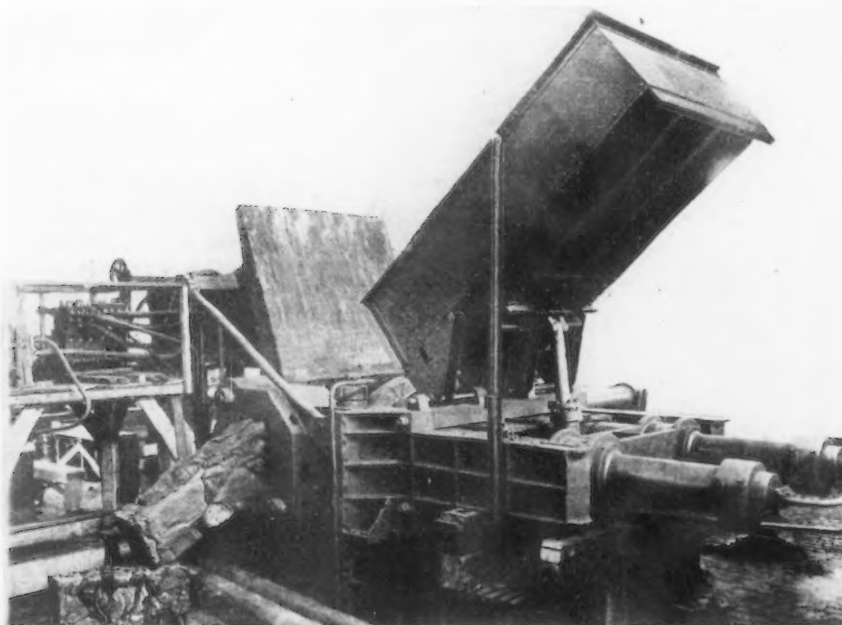
All movements of the rams are controlled by a single handwheel at a central valve station, where the water is admitted to the various hydraulic cylinders. By turning this wheel in one direction the press will execute the various compressing operations in proper sequence. A special indicator near the operator shows at a glance the exact position of any of the press rams. It is possible to cause the rams to advance rapidly at the start of the stroke and to reduce the speed with the increasing density of the bundle.

The bundling presses are capable of handling iron scrap 1/16 in. or less in thickness. Long, clinging or curly turnings may be bundled without the addition of other scrap; short steel turnings, however, must be mixed with 40 or 50 per cent of light iron scrap in order to bundle properly.

Bundles measure 24 in. wide, 16 in. high and from about 50 to 62 in. long. The latter dimension depends upon the nature of the scrap in the bundle, scrap of different densities being compressed varying amounts by the high pressure ram. The average weight of bundles ranges from 1120 lb. for wire scrap to 1560 lb. for stampings. The capacity of the press illustrated is about 7½ tons an hour.

### Blocking Press Gives Higher Compression

Compression of scrap into solid blocks is accomplished by a press of similar design but providing a higher degree of compression than the bundling press described above. Blocks about 30 in. long are produced, the length depending on the composition of the scrap. An output of about 7 or 8 tons an hour is produced by the blocking press, which is equipped

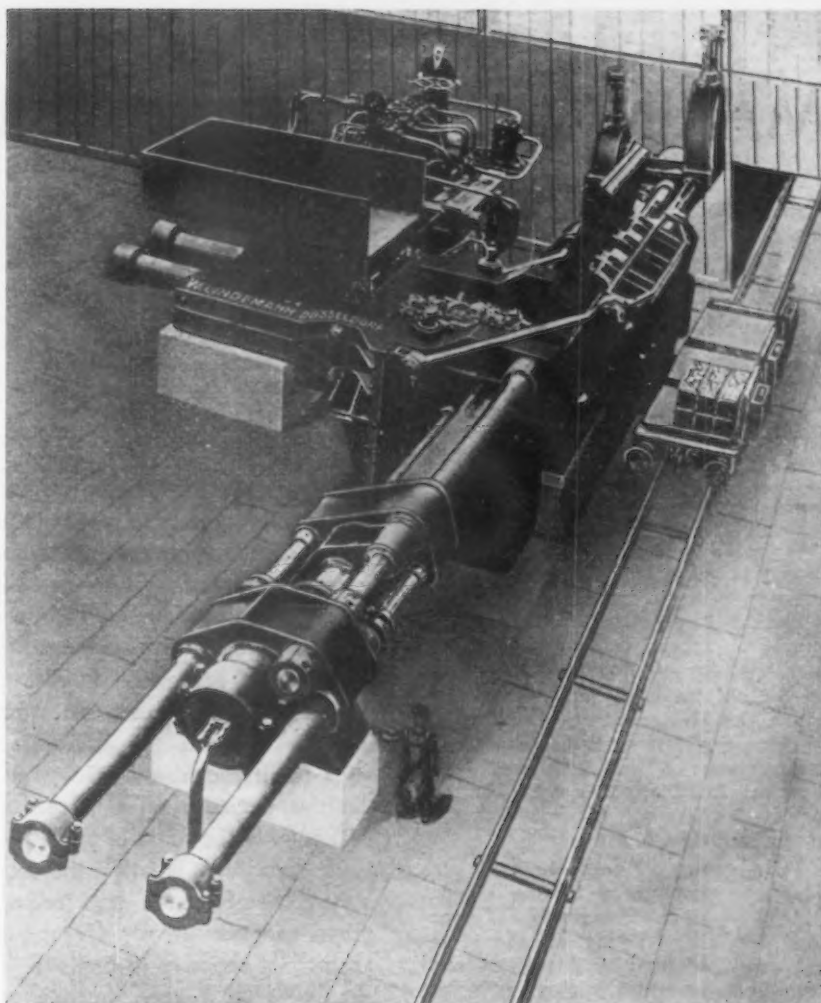


The product of the bundling press, illustrated above, facilitates the charging of open-hearth furnaces with stampings, turnings and similar forms of scrap.

with two multi-stage hydraulic pressure pumps driven by electric motor through belting and tension pulley. Central control, automatic cut-off at maximum pressure, emergency brake and other features of the bundling press are included in the design of the blocking press.

Experiments have been made by the Klöckner-Werke A.G., Georgsmarienhütte, and other German steel works with a view to rolling these blocks directly without remelting. Results are said to be favorable; at one plant blocks were rolled into sheets 1/32 in. thick. Three blocks made for experimental purposes are illustrated. Block No. 1, weighing 366 lb. and consisting of new steel sheet scrap exclusively, welded perfectly in the reheating furnace and was rolled into bars of good quality. Block No. 2, weighing 570 lb., contained both new sheet trimmings and melting scrap. The third block, which weighed 532 lb., consisted exclusively of melting scrap. Because of the low quality of the scrap used for blocks 2 and 3, they did not weld completely and bars rolled from them did not give satisfactory results.

THE large press at the right was built for compressing scrap into compact blocks. Like the bundling press, it is of the triple-acting, hydraulic type.



## Instrument for Rapid Testing of Light Springs

FOR accurate extension or compression tests and quick inspection of typewriter, adding machine and similar light springs, the Coats Machine Tool Co., 110 West Fortieth Street, New York, has placed on the market a new "Elasticometer" loose-weight and pendulum indicating spring testing machine designated as the type RS. Maximum capacities are: load, 5 lb.; open length of compression springs, 6 1/4 in.; extended length of compression springs, 8 3/4 in.; spring diameter, 1 1/4 in.

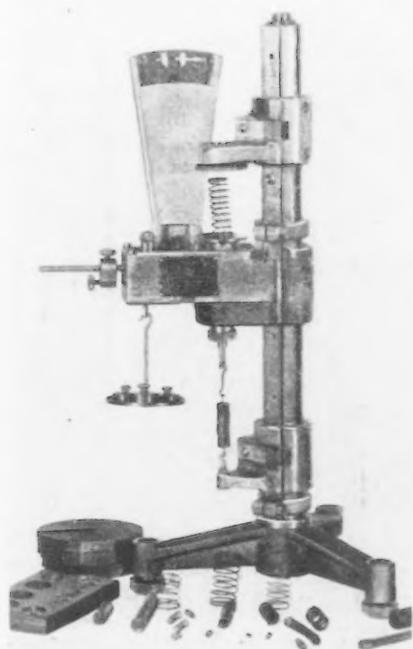
A scale ratio of 1:1 is provided by the single lever or beam mounted on knife edges of the same design as used on larger Elasticometer spring testing machines. From the outer end of this beam is suspended a weight pan; the other end supports a bar, guided by steel balls and carrying a compression plate or platform at the upper end and a tension hook below. The

indicator pointer is directly attached to the beam.

Tension and compression tests are made by means of slides on the pillar of the instrument. Vertical scales on the pillar and verniers on the slides permit accurate measurement of the amount of expansion or compression. Adjustable stops limit the motion of the slides for quantity inspection.

To facilitate inspection of the free, compressed or extended length of springs, there are tolerance indicators arranged to slide along a groove adjacent to the scale on the pillar. Other tolerance markers, located on the indicator scale, may be set to the limits of spring tension or compression required. Although designed for a normal load of 5 lb., the machine, when supplied with a longer weight carrier, may be used for compression loads up to 11 lb.

Equipment includes a sliding weight for balancing the pointer at the zero mark of the scale, and a set of weights for use in the balance pan. The instrument is 20 in. high; it weighs 27 lb.



# MAKING A NATIONAL DROP FORGING SURVEY

By C. H. SMITH

President, American Drop Forging Institute



**T**HE drop forging industry is embarked upon a work of scientific self-examination which is expected to prove another milestone on the way to the cooperative solution of its common problems. This is the survey or special trade census of the industry—its equipment, investment, productive methods and resources—which the United States Department of Commerce has agreed to conduct at the request of the American Drop Forging Institute, and with the anticipated active aid of every member of the industry.

The maxim "Know thyself" was long ago pronounced by the ancient Greeks to be the foundation of practical wisdom. Today we see it increasingly adopted by American business as an essential working principle for continued survival and success.

Probably at no previous time in our economic history was there such pressing need as now for full and accurate knowledge by business of its own internal conditions, if that business is to remain in operation and enjoy a fair return. This is true of the individual concern. It is equally true of industries viewed as a whole.

## What Past Studies Showed

Like practically all other important manufacturing lines, the drop forging industry has witnessed a tremendous expansion in the past 10 or 15 years. This has brought numerous benefits, but many problems as well—problems involving in many cases new principles of management, engineering, marketing and research. Statistics show that there is scarcely an industry in the United States that cannot produce more goods than normal domestic consumption needs require. This is one of the principal factors contributing to the declining margin of profits of industry in the last few years.

Data compiled for 1925, covering a limited number of drop forging companies, revealed that the average concern was operating at only about 62.7 per cent of capacity, while in 1928 these same companies operated at barely 66 per cent. In other words, during those years, which certainly were not below average business

**A**N opportunity for drop forging manufacturers to prepare the way for more profitable operation is to be afforded, as a result of a survey of their production facilities and the extent to which these facilities have been used in recent years. For many years the steel industry has had this measuring stick for its activities. Other industries having similar means of determining their rate of operation have profited greatly thereby. When, therefore, the drop forging group can measure its operations against its capacity to produce, it should be in a good position to capitalize on the information thus made available. How the survey is to be made is told briefly in this article.



years, the industry had a surplus capacity of 34 to 37 per cent.

## To Learn Where Industry Stands Today

What is the situation today? Clearly, that is a question we must ask research to answer, if we are to gain an understanding of the industry which will enable us to meet its current needs, cultivate and expand its markets, and stabilize its policies. We cannot hope to meet adequately our immediate problems, or prepare for the future demand for our products, without a thorough knowledge of the industry as a whole. We must deal with facts and figures beyond the realm of individual companies.

This drop forging survey is designed expressly to provide the information we need. Briefly, it will consist of two parts—one pertaining to all manufacturers of drop forgings, and the other pertaining to those manufacturers who sell all or a substantial part of their total output as rough forg-

ings. The survey will be made by the questionnaire method. A separate questionnaire is to be used for each phase of the survey, and the first phase will be completed before the questionnaires for the second part are sent out.

The principal objects which are aimed at in the first phase of the survey are:

1. To determine the relative importance of the different types of forgings produced, such as automotive, airplane, railroad, agricultural implements, motors and engines, machinery and other forgings.
2. The investment in drop forging production in 1928, 1929 and 1930.
3. The total annual tonnage of rough drop forgings manufactured each year from 1925 to 1930.
4. The total tonnage of drop forging production sold as rough forgings in each year from 1925 to 1930 inclusive.
5. The capacity of the industry in terms of maximum production of drop forging tonnage.
6. A census of equipment, showing both hammers and upsetters of various types, together with the amount of change in equipment in the period from 1928 to 1930.

The second phase of the survey will cover in part such matters as the monthly sales of rough drop forgings for the period of 1925 to 1930; the annual sales for each of these years of the various types of forgings; and the value of the annual shipments for 1925 to 1930 to the various States and sections, as New England, New York, New Jersey, Pennsylvania, Ohio, Michigan, Illinois, Indiana, Missouri, Wisconsin, etc.

Even this brief outline should serve to make plain the scope and importance of the survey. Nothing on a similar scale has ever before been attempted in the drop forging industry. The information to be gained is going to provide us with the most complete and comprehensive picture of the industry ever obtained, and throw light on many of the difficulties with which we are now grappling more or less in the dark. The results of the study will have application in two ways.

## How the Industry will Benefit

First, for the individual manufacturer.—From it he will obtain data by



means of which he may compare his own plant and operations with those of other concerns of the industry in his own size group, or with those in the same general geographical location as himself. For instance, he may gage with an accuracy heretofore impossible the degree to which his business approaches—in trend of output, types of product, capacity and equipment in relation to investment—the average of other establishments with characteristics similar to his own. The survey will supply him with a new measuring-stick for his operations which may prove illuminating in a number of ways.

The second use of the survey concerns the industry as a whole. From the pressure and complexity of modern conditions many problems arise which the most efficient manufacturer cannot solve satisfactorily by his efforts alone. For these, group action is imperative. The drop forging survey is going to provide the facts upon which may be formulated group policies which will conduce to more profitable operations for all concerned. It will at the same time aid in consolidating the position of the industry in the national economic scheme.

#### How the Task Is to Be Performed

Two thousand questionnaires for the first part of the survey are being mailed to drop forging manufacturers in all parts of the country. Every effort has been made to obtain complete coverage of the industry, regardless of trade affiliations. The mailing list for the survey was made up with the cooperation of manufacturers of equipment used in making drop forgings, who went to considerable effort to supply their lists. Additions were made by the Department of Commerce and by the American Drop Forging Institute.

The questionnaire itself was prepared in preliminary draft by the institute. In its final form it is the result of cooperative efforts of members of the trade and the Merchandising Research and Iron and Steel divisions of the Department of Commerce. A substantial share of the cost of the survey, such as printing the questionnaire, covering letters, and other incidentals of the survey is being borne by the institute, which is providing funds also for payment of a statistical assistant to aid in the work.

As rapidly as the questionnaires are returned they will be tabulated by the Department of Commerce, and when complete the results will be subjected to close analysis by the department's trade specialists. Upon completion of the study the statistical data obtained, together with the general conclusions drawn from it, will be issued as a printed Government report. A copy of this report will be mailed without charge to every concern cooperating in the survey.

Every effort will be made to present the material in readily under-

standable terms, and in a form which will be easily applicable by the individual drop forging manufacturer in appraising the operations of his own enterprise.

#### Benefits Will Match Completeness of Answers

The fact cannot be overemphasized, however, that the benefit of the survey to all concerned is directly dependent upon the completeness of the cooperation obtained from all members of the industry, in providing the information called for in the questionnaire. Every report returned to the Department of Commerce will add just that much to the accuracy and completeness of the result and the extent of the potential benefit which each manufacturer may expect to draw from it.

In view of the brevity and simplicity of the questionnaire, it is believed that this cooperation will call for a minimum of effort on the part of the reporting firm. Most of the information requested will in general be available from the regular records of the concern. In those instances in which the requested data are not readily available, the time required to obtain the necessary facts will itself result in

the revelation of comparative information of direct value to the business.

All individual reports will be held strictly confidential. Questionnaires will be returned direct to the Department of Commerce and will be handled entirely by officials of the Bureau of Foreign and Domestic Commerce. No access to the returns will be permitted to any private agency or to the representatives of any other Government department.

As soon as the returned questionnaire has been received, the identification coupon will be detached. The questionnaire will then become simply an anonymous part of the general pool of data from which the facts concerning the industry are to be obtained. As presented in the report, the figures will be so grouped and combined that no possibility of even the most indirect revelation will exist.

The present time is peculiarly opportune for the undertaking of a work such as the drop forging survey. It is in the hours of depression, when the faint-hearted are content to wring their hands and lament their fate, that those who have the courage for self-searching lay the foundations for larger success when the sure rebound arrives.

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## U. S. Steel Describes Its Rustless Alloy Steels

The extent to which two of the subsidiaries of the United States Steel Corp. have gone into the production of the rustless and heat-resisting alloy steels is revealed in an elaborate booklet of some 35 pages, recently issued. It is entitled "U. S. S. Stainless and Heat Resisting Steels."

In a foreword it is stated that the finished products are provided for the market by the American Sheet & Tin Plate Co., Pittsburgh, which is offering sheets and light plates of these materials; the American Steel & Wire Co., Chicago, which is prepared to produce cold-rolled strip steel, wire and wire products; the Carnegie Steel Co., Pittsburgh, and the Illinois Steel Co., Chicago, which offer bars, plates, shapes, special sections and semi-finished products; and the National Tube Co., Pittsburgh, which is prepared to make pipe and tubular products of these steels.

There is an introductory part discussing the character of these steels in general, followed by sections which deal with the various types under the designation USS 18-8, USS 17, USS 12 and USS 12 Z, USS 27, and USS 25-12. The composition, physical properties, resistance to corrosion, recommended procedures for the use of each one of these types, as well as the metallurgical nature of them, are given in each case. There are illus-

trations which show products which can be made from each of these types. The booklet concludes with a list of a few typical applications of the alloy steels of the USS series.

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Three nitriding steels, which are being produced by the Crucible Steel Co. of America, are described in a 32-page booklet entitled "Nitriding and Nitriding Steels," which the company has recently issued. The three steels are the aluminum-chromium-molybdenum, the aluminum-molybdenum or "Alamo," and the chromium-vanadium types. Following a preface, and a general discussion of the nitriding process, the booklet describes the composition, the heat treatment, the drawing temperature and the physical characteristics of each one of the various types. Some information is also given as to the uses to which the different types are suited. The booklet also contains a partial list of reported successful applications of nitriding steels.

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DeWalt Products Corp., Lancaster, Pa., makers of high-speed cutting equipment, has appointed DeWalt Machine Co., division of Lee Finish Corp., 248 West Fifty-fifth Street, New York, as its exclusive dealer for the New York territory.

# MACHINE-SHOP TOPICS PROMINENT AT A. S. M. E. HARTFORD MEETING

PERFORMANCE of commonly used cutting fluids, effect of composition and heat treatment on the machinability of a number of steels, and the development of gages and small tools for interchangeable manufacture were leading topics discussed at the machine-shop practice sessions of the A. S. M. E. meeting held in Hartford, Conn., last week.

Cooling rather than lubrication appears to be the primary requisite of a cutting fluid, according to a recent investigation reported in a paper on "Performance of Cutting Fluids," by Prof. O. W. Boston, College of Engineering, University of Michigan, and C. J. Oxford, chief engineer, National Twist Drill & Tool Co., Detroit. This paper, presented as progress report No. 3 of the A. S. M. E. subcommittee on cutting fluids, was highly commended in the discussion; in the words of one prominent engineer, it is the "first contribution in figures and amounts that we have."

The paper presents the results of experiments to determine the influence of 11 commonly used cutting fluids on the power required to plane and drill annealed S. A. E. 3150 steel. The planer set-up included a dynamometer mounted on the bed. Equipment for the drilling tests comprised a drill press, dynamometer and gages and a recording watt-meter. The arrangement was such that the torque and thrust at the drill point could be determined as well as the input power developed by the motor. Standard

taper-shank  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1 and  $1\frac{1}{4}$ -in. high-speed steel twist drills were used.

Preliminary drilling tests included one to determine the influence of dulling during use. Tests were also made to confirm the torque and thrust formulas developed from previous investigations on a variety of steels and using a soluble cutting oil. The equation for torque was found to be identical with that previously reported, and the difference in the equations for thrust was found to be small.

## Influence of Quantity of Cutting Fluid

The commercial drilling tests were run with the coolant dumped on the drill, just above the work, a large volume of oil being supplied at a low velocity. To get some idea of the influence of other methods of applying oil, however, in other tests the oil was applied in various quantities and by different methods. It was said that there appears to be an advantage in using the oil-hole drill and forcing as much oil as possible to cool the drill point.

After running a number of tests with all drills in each oil, the values for both torque and thrust, as well as for gross horsepower to drive the drill press, were averaged numerically, and these averages plotted. A sample of each of the cutting fluids used in drilling was subjected to a lubrication test to determine the value of each of the cutting fluids as a lubri-

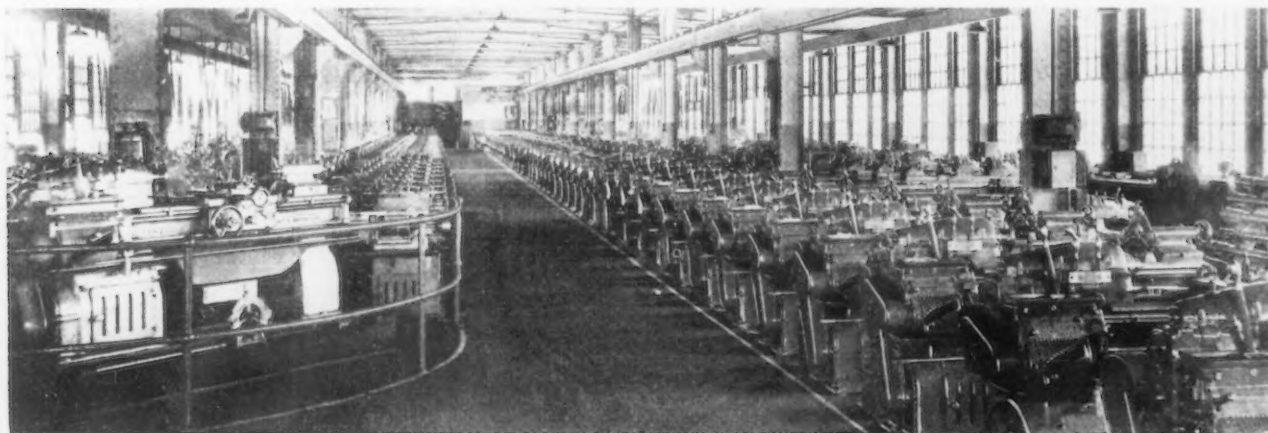
cant. Curves correlating the machining and physical properties of the cutting fluids are included in the paper.

Conclusions drawn from these metal-cutting tests were summarized in part as follows: A newly sharpened drill produces a torque somewhat below its normal value during the first few inches of metal drilled. Increase in torque and thrust appears to be less marked when drilling to almost the endurance limit of the drill if the cuts are made dry. When coolant is used the torque and thrust are lower at the beginning of the cut, but both torque and thrust increase in value faster than when the cutting is done dry; they seem to be higher just before tool failure occurs, that is, after drilling many inches of metal when a cutting fluid is used than when cutting dry. These conclusions, it was pointed out, require further proof.

## Large Amount of Oil Lowers Torque and Thrust

It appears that the quantity of cutting fluid delivered at the point of the drill influences the value of the torque and thrust as follows:

The lowest torque and the lowest thrust for most of the cutting fluids were obtained when the oil was supplied to the drill point in the greatest quantity. If only a little oil, enough for continuous flow, is applied to the drill point, somewhat higher values of torque and thrust are obtained for most oils. By pouring the oil on the



1920—The Iron Age, June 11, 1931



drill above the work at the point where the drill penetrates the work, values of torque and thrust are obtained which correspond quite favorably to the condition of a small quantity of oil being applied to the drill point. The torque is usually highest when the hole being drilled is full of oil, but when none is being added. The above would indicate that the torque is highest when the cutting fluid is at the highest temperature. All of the cutting fluids used follow this general rule.

It appears that the torque for a given drill diameter, feed, and speed varies as different cutting fluids are applied. Oil No. 9 (5 per cent oleic acid in light mineral oil) produced a torque slightly greater than that developed when cutting dry. All other cutting fluids produced a torque less than that produced when cutting dry. Oil No. 8 (10 per cent lard oil in light mineral oil) produced a torque slightly less than that of dry cutting. The torque is reduced still further for the cutting fluids in the following order: No. 6 (a light mineral oil), No. 5 (No. 1 lard oil), No. 7 (a heavy mineral oil), No. 4 (a 1 to 10 soluble oil), No. 3 (a 1 to 50 soluble oil), No. 2 (1½ per cent borax in water), No. 11 (sulphurized-lard mineral oil), and lastly, oil No. 10 (a sulphurized mineral oil). The two sulphurized oils give the lowest values of torque under all conditions. The fact that the borax water gives the third lowest torque might indicate that the cutting fluid exerts a cooling influence rather than one of lubrication.

#### Horsepower Input Varies with Torque Values

The thrust on a drill operating under given conditions of speed and feed varies in accordance with the specifications of the cutting fluid used. The thrust is reduced with the oils arranged in the same order as when the torque is reduced, except for oil No. 6 (light mineral oil), which seems to produce a thrust somewhat below the expected value for all drill sizes.

The net horsepower input required

## COMPREHENSIVE PROGRAM

WITH 12 technical sessions, visits to airplane, machine tool and other manufacturing plants and entertainment that included a banquet, dance, musicale and lamb bake, or barbecue, those responsible for the program of the American Society of Mechanical Engineers' meeting held at the Hotel Bond, Hartford, Conn., June 1-3, provided generously for the profit and enjoyment of the visitors. The same can be said, for the most part, of the weather man.

Machine shop practice topics included a study of cutting oils and discussion of gages and small tools. Applied mechanics, with five or more papers, was

well represented, and an informal conference on equipment selection and replacement was a feature. Various A.S.M.E. research committees contributed to the comprehensive program, while divisions represented included the aeronautic, power, fuels, petroleum and textile. A roundtable discussion of employment stabilization, with E. P. Bullard, president, Bullard Co., Bridgeport, presiding, was sponsored by the management division.

Headed by C. R. Burt, president, Pratt & Whitney Co., the local committees earned a unanimous vote of thanks for what they did to insure the success of this meeting.

to drill the S. A. E. 3150 steel appears to vary for the different oil specifications in exact accordance with the torque values. This relation holds for all drill diameters.

When cutting with the planer tool, it was noticed that every chip, regardless of the combination of depth and feed, has a built-up edge on the tool point when cutting dry and with all of the cutting liquids used. There appears to be little difference in the finish left by the cutting tool for a given depth and feed for different cutting fluids.

In planing with any given cut there appears to be little difference in the planing force for the cutting fluids as a group, with Nos. 10 and 11 omitted. For this same group, the drilling torque and thrust for all drill diameters at their respective feeds and

speeds showed a definite influence of the cutting fluid.

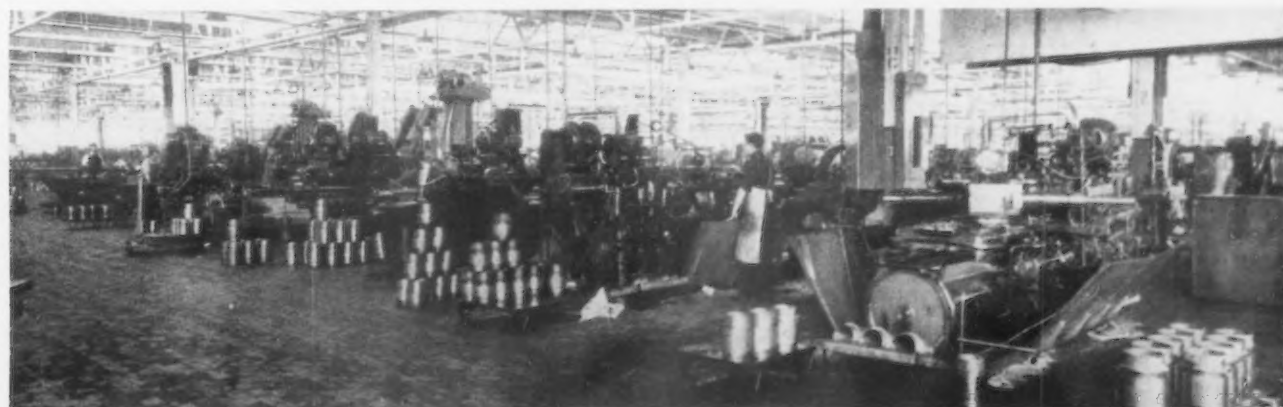
The curve representing the values of drill torque over the cutting fluid seems to conform very closely to the curves representing planer force and drill thrust; that is, the properties of the cutting fluids seem to be equally well represented by any one of the machining-data curves.

#### Effect of Heat Treatment on Lathe Tool Performance

AT the same session, T. G. Digges, associate metallurgist, Bureau of Standards, Washington, presented the results of an investigation on the "Influence of Chemical Composition and Heat Treatment of Steel Forgings on Machinability with Shallow Cuts." This study of high-speed steel tool performance as affected by these fac-

Shops visited during the meeting included that of the Pratt & Whitney Aircraft Co. and of the Pratt & Whitney Co. A general view of the cylinder barrel department of the aircraft engine plant is shown below; this plant, opened in January, 1930, proved of unusual interest not only because of its modern equipment and methods but because of the exacting standards of workmanship.

Manufacture and assembly of precision machine tools was seen at the Pratt & Whitney Co., plant. The lathe assembly floor shown on the opposite page is typical of the "good housekeeping" for which this plant is noted.





tors of the steel cut included consideration of surface finishes, microstructure of the material cut, and also tool performance as affected by additions of cobalt to the 18 per cent tungsten type of high-speed steel. The metals cut comprised a plain carbon steel and various alloy steel forgings heat treated to give tensile strengths ranging from 75,000 to 220,000 lb. per sq. in.

Machinability was measured in terms of the cutting speed permitting a definite tool life; those materials which under otherwise fixed conditions permit the longest cuts without regrinding the tools are described as the most readily machinable or to have the highest degree of machinability.

As in previous tests at the bureau, the test method comprised the use of two tools set at equal depths in one tool holder. The arrangement was such that the second, or indicating, tool would not cut until the wear on the leading, or test, tool was from 0.001 to 0.002 in., and this was considered the point of failure of the test tool. The tests were made dry, and with a feed of 0.0115 in., and a depth of cut of 0.010 in.

Measurable and consistent differences were observed in the machinability of the carbon and alloy steels. The fact, however, that a given steel permits a higher cutting speed than another steel for some tensile strength which is the same for both materials does not necessarily indicate that the two steels maintain the same relationship for another tensile strength.

#### Carbon Steel Most Difficult

Of the different steels cut in the lathe tests, the 0.40 per cent plain carbon steel was the most difficult to machine with shallow cuts other than an annealed nickel-chromium steel. The surface finishes of the carbon-steel forgings were also inferior.

Effect of changes in chemical composition of steel forgings upon their cutting speeds was said to be dependent upon the tensile strength at which the comparisons were made. In the different steels machined with shallow cuts the most effective special alloying elements for improving machinability were said to be the combinations of nickel and chromium or

chromium and vanadium for the high tensile strengths in the neighborhood of 180,000 lb. per sq. in., while chromium and molybdenum were the most effective in the lower range of about 90,000 lb.

The lathe tool performance was said to be improved by the additions of cobalt (together with higher hardening temperatures) to the customary 18 per cent tungsten type of high-speed tool. The maximum gain in performance was shown when cutting forgings having tensile strength up to about 170,000 lb. per sq. in. As in previous tests, it was found that increase in cobalt above about 5 per cent did not produce improvements in tool performance of the same order as those resulting from 3½ to 5 per cent and higher hardening temperature.

R. E. Flanders, manager, Jones & Lamson Machine Co., Springfield, Vt., was chairman of this session.

#### Gages and Tools for Interchangeable Manufacture

**T**HAT gaging facilities are keeping well abreast of the progress in production machining equipment was apparent from the discussion at the second machine shop practice meeting, which was presided over by F. S. Blackhall, Jr., vice-president, Taft-Peirce Mfg. Co., Woonsocket, R. I.

The machine of 20 years ago which would duplicate work to within 0.001 in. has been superseded by the machine which will duplicate to within 0.0001 in. in less time, said T. F. MacLaren, Brown & Sharpe Mfg. Co., in an address on "Conventional Gages and Their Application to Duplicate Production." Likewise the gage department which considered 0.0001 in. to be the last word in accuracy is now measuring much more closely, and with less difficulty. Every forward step in accuracy by the machine manufacturer is a challenge to the gage maker, he said.

In discussing correct design, it was pointed out that the accuracy of the shop gage is dependent upon the precision desired; the most accurate gage is not necessarily the best for the job. If the gage controls the work to a tolerance less than required by the design of the piece, with the resulting decrease in production and increase in costs, the gage is not well designed. The nature and the number of pieces are factors which should determine the nature of the design with reference to the durability of the gage. Aluminum, for example, is apt to wear a steel gage more rapidly than cast iron. Where production runs into thousands of pieces, the gage points should be made of a metal that can be heat treated, while for small production the gage point material may be of a less expensive and less durable metal.

Gage points should be easily accessible, both to facilitate gaging and to permit prompt detection of foreign

material that may cause error. Losses due to interference at the gage points may amount to hundreds of dollars in a very short time.

The gage makers' tolerance should be placed on the "wear side." Every gage is in error to some extent. Where a gage maker is given a tolerance, commercial gages should be designed so that as much metal as possible may be left on the gage points.

A number of interesting gages, one for testing a sewing machine hook and hook needle, a composite piece, were described briefly by Mr. MacLaren. Arc welding was said to be now used extensively in the manufacture of gages; in one case cited the welded gage was finished in 70 hr. as compared with three weeks previously required.

Standardization in gaging was said to be increasingly essential and in this connection the inspection practice recently adopted by the American Gear Manufacturers Association was mentioned. That practice includes photographs and sketches of a variety of gear-testing devices; similar codes might be advantageously adopted by other engineering associations, it was pointed out.

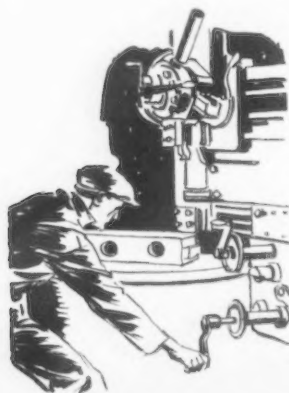
#### Careful Specification of Working Tolerances Eliminates Waste

Thorough engineering practice in dimensioning drawings of the parts of the product, with tolerances, was urged by E. J. Bryant, manager gage and reamer departments, Greenfield Tap & Die Corp., Greenfield, Mass.

With the proper specifications the designing of proper gages for the part is greatly simplified, he said. Usually it is only when limit gages are to be put on the job that serious consideration is given to the tolerances that can be allowed. A large percentage of the drawings received with instructions to supply limit gages do not have sufficient information from which to set proper limits; this calls either for applying general practice or delaying the work until more information relating to the functional requirements of the part can be obtained.

Gages answer the workman's question regarding the accuracy to which he must work. With the drawings properly dimensioned and gages made to these dimensions, no time is wasted by the workman or the foreman in guessing at the accuracy required. In many shops, the management does not insist that the necessary time be taken to produce proper drawings and tools before proceeding with production, said Mr. Bryant. Losses incurred from such procedure are continuous from the time the incomplete drawing leaves the engineering department until the shop has discontinued manufacture of the part to that drawing. The losses from this procedure run into millions of dollars annually, he added.

(Concluded on page 1951)





## A RAPID SURVEY OF THE WEEK'S EVENTS

### MARGINS

W. H. RASTALL, chief of the industrial machinery division of the Department of Commerce, tells us what happened to the profits of eight machine tool builders last year. While their 1930 volume was 70 per cent of the 12-year average, a total net profit for the eight companies of nearly six million dollars became a deficit of nearly \$200,000 in 1930.

Theoretically, from the manufacturer's standpoint, one should raise prices in dull times to make up for decreased volume, but this will not work in practice. From the economic standpoint, one should raise prices in good times, both as a curb to inflation of volume and to secure a reserve for profitless periods. But that doesn't help us today. The way out is for industry to realize that it pays to replace obsolete equipment during dull times. That will reduce costs for the manufacturer and restore the volume of the machinery builder.

### GERMANY

FEDERATION of German Machinery Manufacturers has completed an obsolescence survey covering many classes of industrial equipment. Its purpose is to arrive at reasonable depreciation rates. Minimum age limits are established for accounting purposes.

While complete data are not yet at hand, it is evident that the rates established are much more in line with present day obsolescence practice than those recently established by our own Internal Revenue Bureau for tax purposes, which were evidently based on maximum life instead of minimum.

Incidentally, the findings of the German federation will bear great weight, for this body embraces the makers of all classes and kinds of machinery. There is need of an organization of this kind in the

United States. Our specialized associations are too small in membership to give machinery its proper "voice."

### THREE-YEAR PLAN

WILLIAM K. STAMETS presented a "three-year plan" for industrial modernization at the recent meeting of the Associated Machine Tool Dealers. In brief, this proposes that American manufacturers shall make an immediate survey of equipment and methods, resulting in the segregation of that which is found obsolete. The next step is to be the adoption of a definite replacement program, which will put American production on a modern basis within a three-year period. Replacement of at least 20 per cent of the obsolete equipment during 1931 is urged.

The probabilities are that any manufacturer who takes the first steps in this program will learn some surprising things about his own business that will prove the next steps to be good business.

### DROP FORGINGS

AT the request of the American Drop Forging Institute, the Department of Commerce will conduct a special trade survey of

### COAL STRIKE

IN 1922 the coal strike was the turning point toward recovery from depression. Shortage of furnace coke drove the price from \$3.25 per ton to \$7.50, Connellsville, in the span of a few weeks. Pig iron and steel prices stiffened accordingly and demand picked up through fear of curtailment in supply. It does not need much to turn the present tide; perhaps this coal strike may do it.

the equipment, methods, resources and investment of that industry. This is designed to provide the information needed for the members of the industry to better adjust themselves to the potential operating levels through the application of a capacity yardstick.

### RESPONSIBILITY

INDUSTRY has always recognized the fact that it must buy materials, hire workers, and pay wages," says A. W. Robertson, chairman of Westinghouse Electric & Mfg. Co. "but now we know that we must assume responsibility for the care of employees which was previously a matter left to the individual or State."

Over-all planning, on the part of industry and the government, Mr. Robertson believes, will help industry to live up to this responsibility through avoidance of dangerous expansion in capacity.

### REPLACEMENT

IT is said that there are at least twenty-five different formulas which purport to answer the question, "Will it pay to replace this machine?" Some of them are so complicated as to have little opportunity for use outside of the circle of "higher mathematicians."

Under the auspices of A.S.M.E. committees, Prof. Fairfield Raymond, of M.I.T., is endeavoring to reduce the existing formulas to a common basis and to a practically usable form. An approved formula of this sort would be of benefit to the users and the makers and sellers of machinery.

But to make use of any formula, you must know what to put into it in the way of equivalents. A full knowledge of the limitations of the old machine and the capabilities of the proposed one is essential. If these things are not definitely and accurately known, no formula can produce the answer.

# Industry in Need of Better Equipment Buying Policies

Violent Swings in Demand for Machinery Could Be Leveled Out by Long-Term Planning

By W. H. Rastall

Chief, Industrial Machinery Division, Department of Commerce

THE business cycle is especially severe upon the machinery builder, a fact so well known that such a statement is almost trite. When business is at low ebb the typical treasurer simply cannot be persuaded to draw upon his resources to purchase new factory equipment. At the other extreme, when a boom is on, machinery orders pile up rapidly, buyers are impatient for deliveries and frequently scold the machinery builder because he does not expand his capacity in order that the short-lived impulses of the buyers may not only be met without delay but even anticipated. As a consequence, demand for machinery swings violently from one point to the other, creating a series of problems which management finds burdensome. The typical machinery buyer probably has never given thought to these matters and as a consequence sometimes drifts into a position which the machinery manufacturer feels is unreasonable. Therefore, it has been felt that a little definite information on this subject would be helpful.

The subject is confused a little because the public frequently gives a much broader definition to "machinery" than should be used in this instance; for in reality this particular discussion should be confined to industrial machinery. For example, an important bank recently published a statement showing the profit experience in 1930 as compared with 1929 of perhaps 60 branches of industry, in which connection it was reported that 103 machinery manufacturers had experienced a falling off in net profit of nearly 60 per cent. On going into the details, it was found that in this group had been included manufacturers of office equipment, agricultural implements, household devices and the like, which for present purposes should be excluded, and when this was done information was available on 84 companies.

The subject is further clouded by the fact that certain machinery manufacturers had enjoyed an unusually good year in 1930 because of the recent introduction of patented equipment that resulted in splendid profits but, of course, such examples are not typical. Further, it is felt that interesting information would result by consideration of specific groups.

In analyzing the following it should

be remembered that the 84 companies represented unquestionably include the best names in the machinery industry, the big companies having listed securities, probably those with the most abundant resources and the best management.

## Profit Experience of Leading Machinery Builders

In the group were eight manufacturers of machine tools. The total net profit for the eight in 1929 was \$5,795,706; in 1930 this became a deficit of \$170,701, and yet it is understood that the volume of business in the machine tool industry in 1930 was 70 per cent of the 12-year average. Imagination can only suggest what the record of the industry as a whole might have been and what changes management should make in the business policies of the industry to correct such a situation, especially when present efforts to stabilize employment are considered.

All of this, of course, merely reflects the buying habits of machine tool users, but suggests forcibly that the metal-working industry of this country is in need of a different equipment policy. The welfare of the metal trades is dependent upon the welfare of the machine tool industry, and yet apparently they are doing this industry a great injustice because of poor purchasing methods, a situation which ultimately reflects itself in the entire business field.

Similarly, the reports of two firms making textile machinery show that 1929 profits of \$3,117,034 became in 1930 a deficit of \$642,340.

## Steel Companies Commonly Re-Equip in Depression Periods

It has long been known that the several branches of the textile industry have been suffering severely because of the lack of a reasonable equipment policy. Serious excess capacity is acknowledged, and there are many who believe that some mills are suffering because of the use of much machinery known to be decrepit, and there is the further suspicion that obsolescence is a serious handicap, although a factor that is not always adequately appreciated.

Radically different conditions are found among companies producing machinery for the steel industry.

Probably this is because steel plant managers have developed a definite equipment policy. As a whole, equipment is replaced every 16 years and is commonly replaced during a depression, not at the peak of a boom. As a consequence, it is most significant to observe that two companies serving the steel industry, which had net profits in 1929 of \$3,469,000, expanded these in 1930 to \$4,623,000. Consequently, there is no employment in these plants at the present time. The steel industry has sources of supply for its equipment that are healthy, progressive and of adequate financial strength. Not only can these establishments be depended upon as a source of supply for such equipment indefinitely, but they are in a position to indulge in research and develop new designs as may be required to insure the leadership of that industry indefinitely.

In contrast to this experience in the steel industry, the record of five important manufacturers of pneumatic equipment shows that the net profit for 1929, \$16,347,393, declined in 1930 to \$8,163,937.

Similarly, net profits of six manufacturers of power shovels declined from \$7,135,874 in 1929 to \$2,906,571 in 1930. Certainly it is difficult to see how these machinery manufacturers can serve their customers, can undertake the development and research necessary to insure progress in the face of such a fluctuating demand, and at least one element that must be faced in connection with any program for the stabilization of employment in this country must be in the direction of stabilizing machinery purchases.

It is true that many of the sums mentioned above run into millions and seem quite impressive, but it can probably be added that, with the single exception of the companies manufacturing steel plant equipment, none of the above has earned bond interest on the capital invested in these enterprises so far as 1930 is concerned.

In presenting such statements as the above, classification is obviously difficult, but an effort has been made to include in the totals previously presented only those companies which manufacture almost exclusively the equipment described, although even here a certain amount of elasticity is required. Consequently, there remains a miscellaneous collection of 59 companies whose profits fell from \$40,835,855 to \$23,476,551. Of these, 16 actually showed deficits, and it will be observed that the experience of the group represents a decline of 42 per cent, a radically different figure than the 60 per cent total presented in the above-mentioned bank statement.

## Better Methods Should Be Found for Replacing of Equipment

According to the Census, there are in the United States more than 10,000 firms manufacturing industrial machinery, and it is probably unfortu-



nate that a discussion of this sort must be based on so small a sample, and yet this sample is the most complete that it has been found possible to cumulate readily. Even this statement, however, appears to justify the conclusion that the machinery manufacturer is faced with administrative problems of unusual difficulty, must frequently manage his affairs with great delicacy, and, again, it is emphasized that the industries of this country are greatly in need of a better equipment policy, should find better methods not only of purchasing new machinery but of eliminating the obsolete, as well as the depreciated, and do so as the result of a plan developed to cover the requirements of the industry over a broad period of years instead of yielding to the whims of the moment that appear to have governed too often heretofore.

## Harking Back to a November Forecast

In a recent speech, Prof. William Trufant Foster, economist of Pollock Foundation, Boston, referred to the meeting of a group of leading financial statisticians—experts in business forecasting—in New York on Nov. 4. Professor Foster quoted eight of these experts as follows:

The farmers will not buy much from the proceeds of this harvest; and, with the price declines in process throughout the world, there would seem to be little prospect of any extensive business revival in the near future.

The general prospect is for slow and irregular business for ten years.

I expect to see a long and slow recovery to a general level of subnormal, slow business.

Prices will advance a little from present levels and then fall once more. Recovery will be slow.

Conditions abroad will continue to affect our business conditions here. It is a conservative estimate to say that ten years must elapse before we can see genuinely prosperous business in this country.

Business will come back to fair, slow operations in three years.

The period of readjustment will be long. It will take at least 10 years.

We may expect a slow return to a basis on which business can be done at a profit in about three years.

Professor Foster continued: "These pessimistic forecasts were on the fourth of November. But it was the fourth of November of the year 1921. At that time business was actually improving, although the experts did not know it. Within four months the gain was so marked that everybody could see it. Within sixteen months business was so far above normal that the experts became frightened again. Today, the major economic factors are more favorable to a rapid recovery of business than they were in 1921. It is my sober belief that just as the depressionists of 1921 were routed, so the depressionists of 1931 are in for a rude awakening."

# Canadian Tariff Changes Will Not Seriously Affect Steel

## Study of Metal Schedule Discloses That Some Revisions Are Favorable to United States

WASHINGTON, June 9.—Examination of detailed changes made last week in the metal schedule of the Canadian tariff discloses the fact that, instead of being to the disadvantage of the United States steel industry, some of the revisions are favorable to it.

This trend is seen in modifications where differentials between the three import classifications have been placed either on a parity or narrowed. Since the highest rates come under the general tariff, applicable to the United States and other countries not having commercial treaties with Canada, the establishing of rates in closer relationship or on an identical basis, naturally would tend to be to the benefit of the non-treaty nations. The actual advantage, where it develops, depends on the resulting spreads. The difference may continue to be so great that competitive conditions would work against the United States, despite its advantageous geographical position.

In addition to the general rates, the Canadian tariff provides British preferential and intermediate rates. The latter apply to nations having commercial treaties with Canada. Among countries exporting steel to Canada which have such treaties are France, Belgium and Luxemburg. Germany has no such treaty, and, therefore, like the United States, comes under the general tariff classification.

### Tariff Reflects Effort to Build Up Canadian Steel Industry

There is reflected throughout the Canadian metal schedule revisions the continuing attempt to build up a self-contained steel industry in Canada, tied in with purposes to aid the employment situation. Manifestly certain changes are designed to increase revenue and to further encourage trade with Great Britain. At the same time there are instances where the British preferential rates have been increased more or decreased less than the intermediate and general rates. Likewise there are instances where intermediate and general duties have been entirely made free and products thus placed on the free list, previously enjoyed only under the British preferential classification. The decreased duties and transfer to the free list represent changes covering products not made in Canada which are to be used in finishing plants whose capacities are to be developed or which are to be given the benefit of lower costs. Provisions are also made for fixing

duties in the future on products when made in Canada sufficiently to meet requirements.

Of the changes made in the Canadian metal schedules, it is believed here that the United States steel industry will be affected most by increased duties on tank plates. Even in this case the effect promises to be moderate. On plates not more than 60 in. wide, the British preferential rate was increased \$2.25 a ton to \$4.25 from \$2. The intermediate rate was increased \$2, to \$6 from \$4, while the general rate was increased only \$1, to \$6 from \$7. The result is that the spread between the British and general rate has been narrowed from \$4 to \$2.75, while the difference between the intermediate and the general rate has been cut from \$2 to \$1. Despite the reduction in the spread between the British preferential and general rate, however, the view is held that the advantage still lies with Great Britain, which, while facing higher ocean and rail rates, does not have so high production costs as the United States industry. Nevertheless, it is thought the United States will continue to provide the bulk of the Canadian tank plate imports. That Great Britain is seeking the Canadian market, or at least, a greater share than now enjoyed, is shown by activities of the British Steel Export Association, which recently shipped 1000 tons of plates to the Toronto Iron Works. The British association has announced that it is its policy "not to compete with Canadian producers but to cooperate with them." J. J. Piggott, Canadian representative of the British association, is quoted as having recently said that "the heavier lines of steel are not made in Canada and it is these lines which before the tariff were sent up from Pittsburgh that we aim to export to the Dominion."

On plates more than 60 in. wide the revised Canadian tariff carries no duty under the British preferential, fixes the intermediate duty at \$3 and the general duty at \$5. On flanged, dished or curved plates, the British preferential rate was fixed at 10 per cent, the intermediate rate at 25 per cent and the general rate at 30 per cent. Provision was made that when the governor in council is satisfied that plates are being rolled in Canada up to 120 in. in sufficient quantities to meet Canadian requirements, an order in council may be issued fixing a British preferential rate of \$4.25, an inter-

mediate rate of \$6 and a general rate of \$7. On plates more than 120 in. the proposed schedule would make British imports free, the intermediate rate \$3 and the general rate \$5.

#### Bessemer Billets Admitted Free from Great Britain

The revised tariff carries a new provision which admits Bessemer billets for use of Canadian seamless tube makers free when coming from Great Britain, and fixes a duty of 5 per cent under both the intermediate and general classifications. Similar provision is made for imports of rolled or drawn hoop, band or strip steel for use of Canadian manufacturers of mats. Sheets, plates, hoop, band or strip steel for use of makers of saws or saw cutters were made duty free under all three classifications. Previously British imports only were admitted free, while the intermediate rate was 5 per cent and the general rate 7½ per cent.

Cold-rolled sheets, when imported for coating with tin or zinc, were given a British preferential rate of 5 per cent, reduced from 7½ per cent; an intermediate rate of 7½ per cent, reduced from 12½ per cent, and a general rate of 10 per cent, reduced from 15 per cent. Cold-rolled strip, band or hoop steel, in coils, not less than 100 ft. in length, when imported for making cold-rolled iron or steel products, were continued duty free when coming from Great Britain, the intermediate rate left unchanged at 5 per cent and the general duty reduced from 10 to 5 per cent.

A new provision covers electro-galvanized cold-rolled hoop, band or strip steel, 6 in. or less in width in coils of not less than 100 ft., for the manufacture of rolling doors. British imports were made duty free while the intermediate and general rates were fixed at 7½ per cent. Coated wrought iron or steel tubing, not more than ½ in. in diameter and not less than 6 ft. in length, for further manufacture, was also made duty free for British imports, and given an ad valorem rate of 7½ per cent under the intermediate and general classifications. Puddled oil casing up to 2 in. was made duty free regardless of source of origin. Welded wire fencing, wire cloth and wire netting, coated or plain, were given increased duties. The British preferential rate was increased to 25 per cent from 15 per cent; the intermediate rate to 35 per cent from 27½ per cent and the general rate to 35 per cent from 30 per cent. Steel wire for the manufacture of card clothing was made duty free under all three classifications.

The general duty on basket clause for steel products and machinery was increased to 35 per cent from 30 per cent. The British rate is 15 per cent and the intermediate 27½ per cent. Brass and copper scrap were removed from the free list and given general duties of 10 per cent for the former and 1½c. per pound for the latter.

Present general duties of 6 to 17½ per cent on complete parts for repairs for agricultural machinery and implements were extended to March 31, 1932.

#### Other Miscellaneous Revisions

The general duty on safes, scales, etc., was increased to 35 from 30 per cent. A general duty of 20 per cent was fixed on electro turbo generator sets, 700 hp. and greater, not made in Canada.

The general duty on coke was made dutiable at \$1 a ton. Previously coke was free of duty. Anthracite coal was removed from the free list and given a general rate of 40c. a net ton. The general duty on bituminous coal was increased to 75c. from 50 per cent. Coke and bituminous and anthracite coal is duty free under the Hawley-

Smoot act, but it carries a countervailing provision fixing duties on the same product at the same levels as those imposed on American coke and coal. The result is that Canadian shipments of bituminous coal, made mostly from British Columbia and Nova Scotia, will now be assessed a duty of 75c. when imported into the United States.

The revised Canadian tariff increased the general duty on magnesite to 30 per cent. Previously magnesite, depending on the quality, was duty free or dutiable at 25 per cent.

The general duty on passenger automobiles retailing at \$1,200 to \$2,100 was fixed at 30 per cent. Previous duties on cars in this price range were 27½ to 30 per cent. On cars retailing above \$2,100, the general duty was fixed at 40 from 27½ per cent.

### "Industry Must Assume Care of Employees"

"The present depression is the result of previous tremendous expansion without careful over-all planning on the part of industry and government," said A. W. Robertson, chairman, Westinghouse Electric & Mfg. Co., East Pittsburgh, at a dinner at the Queen City Club in Cincinnati, Thursday, June 4. The dinner was given by George M. Verity, chairman, American Rolling Mill Co., Middletown, Ohio, and Mr. Robertson was guest of honor and principal speaker.

"If we are to prevent great unemployment in the future," Mr. Robertson said, "we must budget our expansion program for the next period of prosperity so that production will meet the reasonable needs of the market, and the danger of overproduction will be avoided."

"The only permanent cure for unemployment is work. I do not mean by this statement to make light of the efforts to alleviate unemployment, but I believe that in effecting remedies to meet our present needs we should keep our minds on the ultimate goal, which is to assure the workman steady employment. Industry has very profitably taken on new responsibilities in recent years. We have always recognized the fact that we must buy materials, hire workers, produce and pay wages, but now we know that we must assume responsibility for the care of employees which was previously a matter left to the individual or State. I refer to the old age pension problem and to the protection of the worker from the danger of unemployment."

The dinner was arranged by Mr. Verity so that Mr. Robertson could meet the industrial and civic leaders of the Miami Valley. A close association has existed between Mr. Verity and Mr. Robertson for a number of years.

### Less Pessimism Abroad Than Here, Says E. T. Weir

The depression in Europe is only of the same degree and arises from the same causes as that in the United States, but there is less pessimism abroad, particularly in France and England, according to Ernest T. Weir, chairman, National Steel Corp., who has just returned from a visit to France, Switzerland, Germany, Holland, Belgium and England.

"The general activity and the extensive construction work being carried on in England, particularly in London and its environs, in no way support the pessimistic statements published here about the English situation. I believe there is more building under way in London than in New York," Mr. Weir stated.

Metal Statistics for 1931, which is the twenty-fourth annual edition, has been issued by the American Metal Market Co., New York. Its 552 pages give a complete record of the production, consumption, imports, exports and stocks of various steel products, including also data on trade terms, specifications, grades, brands and analyses of certain steels and custom duties. Some data are included covering raw materials and semi-finished steel. A few new tables have been introduced, dealing with miscellaneous economic subjects.

Manning, Maxwell & Moore, Inc., 100 East Forty-second Street, New York, states that the recent change in its Chicago office involves only the Putnam machine tools and does not affect the Shaw overhead electric traveling cranes, sales of which in the Chicago territory are still handled at the company's own offices at 80 East Jackson Boulevard. R. M. Jones is district sales manager.



# Railroads Preparing to Urge Increase in Freight Rates

Southern Traffic Officials at Meeting Agree to Recommend Cooperation in Move for Advance

WASHINGTON, June 9.—Traffic officials of the Southern Freight Association at a meeting here today agreed to recommend to the chief executives of Southern carriers that the latter cooperate with Eastern and Western lines in an effort to obtain increased freight rates.

Representatives of the Western Freight Association held a meeting today in Chicago to determine upon their program.

The meetings are preliminary to a general meeting of executives of railroads of the country to be held in New York Thursday. The Eastern railroad executives, at a recent meeting, are understood to have tentatively voted to seek a general increase in freight rates, not to exceed 15 per cent, and the proposal is said to have met with approval of a few Western

railroad executives who were present. It is expected that definite conclusions will be agreed upon at the New York meeting as to the nature of the tariff schedules which it is desired to file with the Interstate Commerce Commission at the earliest date possible.

The proposed increases, it is understood, would not be applied to all commodities, nor would the advances be uniform, but would vary, with a limit of 15 per cent.

The meeting here today was attended by traffic officials of 23 Southern lines and was presided over by J. E. Tilford, chairman of the Southern Freight Association. It was also attended by R. N. Collyer, chairman of the Trunk Line Association, who is reported to have told the Southern carriers of tentative plans of the Eastern lines.

Shipments of fluorspar from mines in the United States in 1930, amounting to 95,849 net tons, consisted of 85,094 tons of gravel fluorspar, 4281 tons of lump fluorspar and 6474 tons of ground fluorspar. The general average value for all grades per ton, f.o.b. mine shipping points, was \$18.22, 84c. less than the 1929 average. The general average value of the fluorspar shipped to steel plants in 1930 from the Illinois-Kentucky district was \$16.99 a ton, compared with \$17.36 a ton in 1929. Fluorspar was shipped from Colorado, Illinois, Kentucky, Nevada and New Mexico in 1930, of which only Colorado recorded an increase.

There was a decrease in shipments of fluorspar in 1930 to each of the industries, except the cement industry, in which the mineral is used. Domestic producers shipped 35 per cent less fluorspar to steel plants and 37 per cent less fluorspar to foundries in 1930 than in 1929. In the ceramic industries the shipments of fluorspar to manufacturers of glass and enamel decreased 45 and 44 per cent respectively, but the shipments to cement plants were a little more in 1930 than in 1929. Shipments of acid-grade fluorspar from domestic mines were 24 per cent less in 1930 than in 1929.

## Fluorspar Industry at Low Ebb in 1930

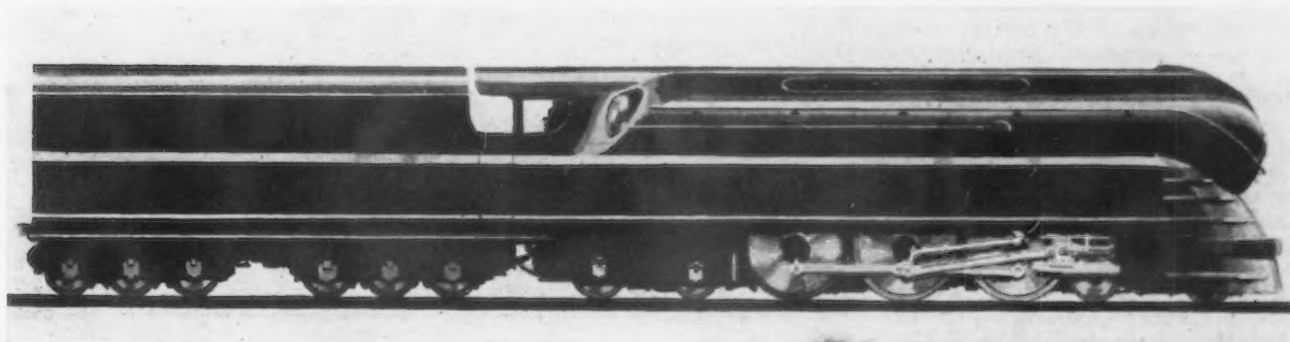
The fluorspar industry was adversely affected by the general decrease in operations during 1930 in the industries in which this mineral is used, and as a consequence the domestic fluorspar producers' volume of business was the smallest since 1921, according to a statement prepared by Hubert W. Davis of the United States Bureau of Mines, Department of Commerce.

Of interest are: the substantial decrease in domestic shipments; the pronounced increase in imports from Germany and France; the increase, effective June 18, from \$5 to \$7.50 a short ton in the rate of duty on fluorspar containing 93 to 97 per cent of calcium fluoride; the large stocks of fluorspar at consumers' plants on Dec. 31, especially the stocks of 89,000 net tons that had been accumulated at basic open-hearth steel plants; and the accomplishment of the first river-rail shipments of fluorspar to the Pittsburgh district.

"Molybdenum in 1930" is the title of an elaborate booklet of 104 pages, fully illustrated, which has been issued by the Climax Molybdenum Co., New York. The aim of the booklet is to present facts about the various uses and applications in industry of molybdenum, as set for in articles appearing in leading scientific and technical journals, both American and foreign, which were published during 1930. The various extracts cover the use of molybdenum in high-speed steel, in aircraft, in nitriding, in the automobile, in special alloy steels and forgings and in steel and iron castings. The use of molybdenum as a catalyst is also included.

## A MODERNISTIC LOCOMOTIVE DESIGN

MODERN design is lending itself to other utilitarian fields, as may be seen in the illustration of a "streamline" locomotive, designed by O. Kuhler, New York. Symmetry of line enhanced by the use of stainless steel together with many new features involving practical advantages offers a drastic contrast with the old "iron horse."



The Iron Age, June 11, 1931—1923-D



## Machine Tool Dealers Discuss Problems

The Associated Machine Tool Dealers held their semi-annual meeting at Granville, Ohio, last week. The attendance exceeded that of any previous meeting of the association, and all of the sessions were enlivened by spirited discussion.

In addition to considering specific topics of immediate interest to the membership, the general sessions provided opportunity for a survey of current problems arising from the present business situation.

The necessity for a scientific approach to the establishment of potential sales quotas, as a means of increasing the efficiency of selling, was discussed. Considerable interest was manifested in the subject of the financing of instalment sales, though the consensus of opinion was that as yet a very small percentage of the machine tools sold have involved more than 90-day credit.

The code of ethics prepared by the association as a guide for its members had, it was reported, received a wide distribution and acceptance outside of the membership as well as within it. This has been prepared in printed form and is available to anyone interested in machinery sales at a cost of 25c. a copy.

Addresses were made at the general sessions by Carle M. Bigelow, of Bigelow-Kent-Willard & Co., Inc., Boston, who spoke on the subject of the scientific establishment of sales quotas and objectives; Kenneth H. Condit, of *American Machinist*, who outlined a plan for modernization through replacement; R. A. Balzari, of the McGraw-Hill Publishing Co., who described the economic approach to industrial selling; and Robert B. Luchars, of *Machinery*, who presented an analysis of buying influences. John H. Van Deventer, of *THE IRON AGE*, made the concluding address on the subject, "Why Not Get Back to Arithmetic?"

## Relation of Equipment Layout to Overhead Costs

"The conclusion which I have reached regarding the type of building, type of equipment, plant planning and layout for any manufacturing is that only in such cases where the quantity warrants single-purpose special machine tools should machinery be placed in sequence of operation and be set up for one operation after another without any interference or breakdown of setups," said E. C. Brandt, assistant works manager, Westinghouse Electric & Mfg. Co., at the production conference of the American Management Association,

held at the Chamber of Commerce, Rochester, N. Y., June 1.

The speaker explained that where multiple-purpose machine tools, such as standard planers, boring mills, etc., are required for any line of manufacturing they should be grouped according to class of machines, and the work handled by conveyors through remote control, dispatching through each one of these groups of machines. Where the activity is not large enough for conveyerizing, materials should be placed in tote boxes or in trucks, which can be equipped with wheels for transporting from one operation to another. Only in cases of very large work is it economical to place material on the floor when handling and rehandling are necessary.

By means of a series of lantern slides Mr. Brandt showed how the arrangement of departments can become very bad when no careful planning precedes normal growth and when equipment is added wherever room can be found. Pictures of the same departments completely rearranged, after a study of operating requirements had been made, were also shown and the marked contrast pointed out.

In the plants under Mr. Brandt's supervision an attempt is made to plan at least a three-year program for layout before it becomes known as obsolete and inefficient. This often requires provisions for the mobility of equipment when the original installation is made.

## Empire Steel Employees Cut Their Own Wages

Employees of the Mansfield plant of the Empire Steel Corp., now in receivership, have voluntarily accepted a 5 per cent cut in wages for a three months' period. On May 1 the company announced a 10 per cent wage reduction, which on May 11 was increased to 15 per cent in some departments. This cut resulted in a strike of the 1000 employees, which was terminated four days later by the restoration of the old wage scale.

A few days later a friendly action in receivership was started and Carl H. Henkle, the president, was named as receiver. Federal Judge Samuel H. West, Cleveland, on June 5 authorized the receiver to continue operation of the company's plants at Mansfield, Cleveland and Niles.

On Saturday, June 6, the General Electric Co., Pittsfield, Mass., opened for inspection its new welded steel transformer manufacturing plant. Transformers made at the plant are to be electric welded. Transformers recently ordered by the Pennsylvania Railroad from the General Electric Co. will be manufactured at the Erie, Pa., plant.

## Coal Miners' Strike of No Effect on Market

Labor difficulties in the coal fields of western Pennsylvania, West Virginia and eastern Ohio, which have been spreading during the last week, have had no visible effect upon the coal market in the Pittsburgh area. Stocks above ground are apparently ample for 30 days' consumption at the present rate of use, and consumers have thus far been rather apathetic to the possible effects of the strike.

With the United Mine Workers of America and the National Miners Union both active in the territory, demands of the strikers differ somewhat in each district affected, and no very definite list of grievances has been decided. At least 30 mines are affected, and among the larger companies involved are the Pittsburgh Terminal Coal Corp., the Bethlehem Steel Corp. mines and the Hanna Coal Co.

## Otis Steel Co. Orders Cold-Rolling Mill

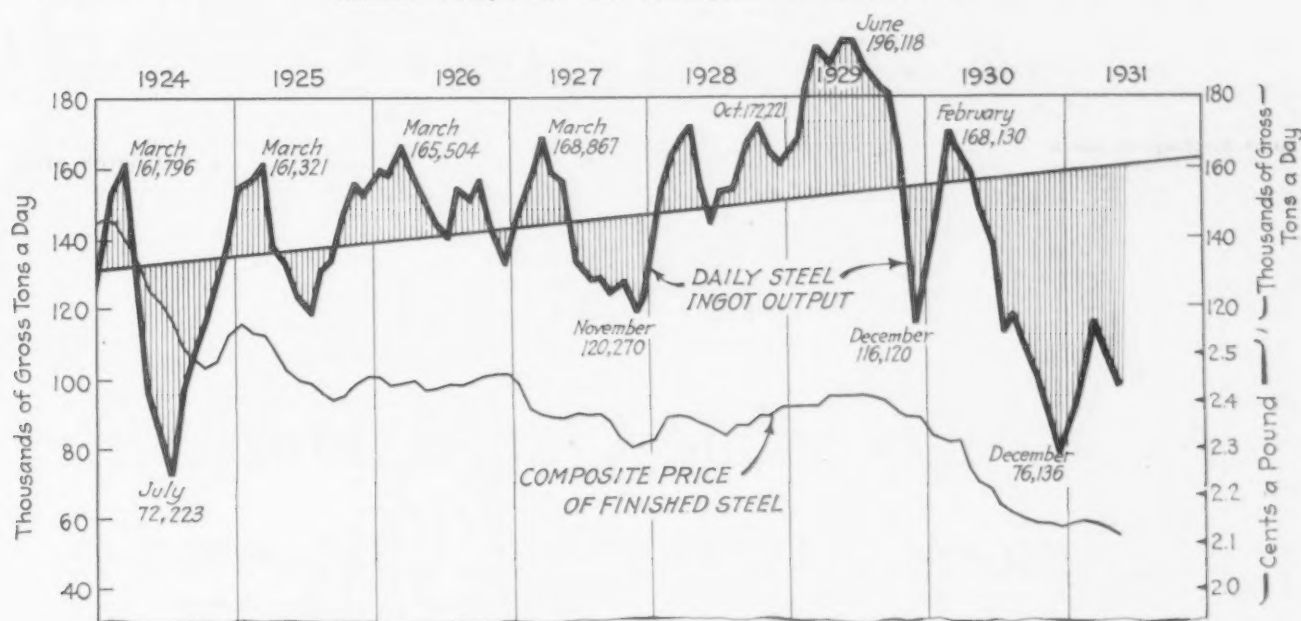
The United Engineering & Foundry Co., Pittsburgh, has received a contract for a new cold-rolling mill from the Otis Steel Co., Cleveland. Delivery cannot be made before fall because of the volume of business already on hand.

This contract is supplementary to that placed early in the year by Otis Steel Co. with United Engineering, involving close to \$2,000,000; under which one new hot mill and the reconstruction of a second hot mill are being undertaken for the Riverside, Cleveland, plant. The new hot mill will be a 72-in. wide continuous sheet rolling mill.

While the hot mill, it is said, will embody several features making it the most modern of its kind, the new cold-rolling mill, which will be in effect a continuation of production from the hot mill, will permit steel practices heretofore never attempted in the industry. While the hot mill will finish steel in both flat and coiled form, only the coiled product will be utilized in the cold-rolling mill. A new and novel automatic uncoiler will be utilized to permit the steel to be passed through the stands of rolls, after which the steel will be coiled again. A new type of flying shear and a leveler will complete the product at the finishing end. Handling the steel in long lengths through the rolls will permit new economies in production.

Follansbee Brothers Co., Pittsburgh, has moved its Milwaukee office to the First Wisconsin National Bank Building. H. H. Wherry continues as district manager, a position he has held for 24 years.

Ingot output in May showed a further decline of 8 per cent after April had dropped 9 per cent from March. The total was the smallest for May since 1921. Prices gave a little more ground.



## Steel Ingot Production Declines Further in May

**P**RODUCTION of open-hearth and Bessemer steel ingots in May declined about 8 per cent from the April figures, which were 9 per cent below those for March. American Iron and Steel Institute calculations place the May total at 2,505,485 gross tons, compared with 2,722,479 tons in the preceding month,

each month having had 26 working days.

On the daily basis, output in May was 96,365 tons, compared with 104,711 tons in April. The May figure was the lowest since last January, and with the further exception of December and November, 1930, was the lowest since July, 1924. It was the low-

est for the month of May since 1921.

Production in five months is calculated at 13,182,609 tons, compared with 20,160,084 tons in the same period last year. The reduction is almost 35 per cent. This is the smallest total for the first five months of any year since 1922. In that year the five-month total was 12,899,339 tons.

Open-hearth tonnage gave more ground than Bessemer in May, having a decline of almost 9 per cent against less than 5 per cent in the Bessemer tonnage. It results that the open-hearth reported output was slightly less than that for February (with only 24 working days), whereas the Bessemer tonnage in May was greater than that in February.

These figures do not include electric or crucible steel. About 0.8 per cent should be added to the tonnage figures in the present text and table, to allow for these grades, in determining the total steel ingot output of the country.

On the basis of estimated capacity, as of Dec. 31, last, production in May is given by the institute at 45.36 per cent, and for the five months as 48.10 per cent. This compares with 73.68 per cent in May, 1930, and with 77.46 per cent in the first five months of that year, based on the estimated capacity at end of 1929.

Stephens Adamson Mfg. Co., Aurora, Ill., has moved its Chicago office from the First National Bank Building to the Civic Opera Building, 20 Wacker Drive.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

	(Gross Tons)					No. of Working Days
	Reported by Companies Which Made 95.21 Per Cent of the 1930 Ingots		Calculated Output of All Companies			
	Open-Hearth	Bessemer	Monthly	Daily		
Total, 1929.....	44,101,321	7,091,680	54,312,279	174,639	311	
1930						
January .....	3,157,761	441,572	3,778,235	139,935	27	
February .....	3,335,428	508,618	4,035,111	168,130	24	
March .....	3,513,269	539,616	4,254,331	163,628	26	
April .....	3,405,671	509,234	4,109,492	158,057	26	
May .....	3,265,353	528,968	3,982,915	147,515	27	
Five months.....	16,677,482	2,528,008	20,160,084	155,078	130	
June .....	2,849,079	407,586	3,418,535	136,739	25	
Six months.....	19,526,561	2,935,594	23,578,619	152,120	155	
July .....	2,430,128	353,723	2,922,220	112,393	26	
August .....	2,541,367	374,467	3,060,763	117,722	26	
September .....	2,275,910	429,975	2,840,379	109,245	26	
October .....	2,165,341	399,704	2,692,539	99,724	27	
November .....	1,807,133	300,339	2,212,220	88,489	25	
December .....	1,659,026	226,786	1,979,547	76,136	26	
Total, 1930.....	32,405,466	5,020,588	39,286,287	126,322	311	
1931						
January .....	2,044,298	296,620	2,458,689	91,063	27	
February .....	2,085,529	296,972	2,502,366	104,265	24	
March .....	2,504,060	346,139	2,993,590	115,139	26	
April .....	2,275,404	316,668	2,722,479	104,711	26	
May .....	2,083,833	301,639	2,505,485	96,365	26	
Five months.....	10,993,124	1,558,038	13,182,609	102,191	129	



## May Automobile Output Declines; Outlook for Summer Uncertain

DETROIT, June 8.

**M**UCH to the industry's surprise, motor car production in May was only 338,307 units, according to the estimate of the National Automobile Chamber of Commerce, thus leaving April, with an output of 352,867 units, as the peak month of the year. The decline is largely accounted for by reduced assemblies of the Ford Motor Co., which turned out 102,095 cars in May, against 117,891 during April, whereas many had anticipated that Ford's May figures would be nearer 125,000. Buick likewise contributed to a lowering of the total, as it made only 9356 cars in May, compared with over 13,000 in April. Chrysler's record is not available, but it is believed to have fallen from 32,000 in April to perhaps 26,000 last month.

For the second time this year Chevrolet wrested the production leadership from Ford by manufacturing 113,852 units in May, thereby topping every month in 1930. In fact, Chevrolet has not produced so many cars since July, 1929, in the heyday of so-called prosperity. Another division of General Motors, Oakland-Pontiac, also broke some records last month with an output of 14,829 cars, which was the highest figure since August, 1929, and 600 cars more than it made in April of this year. Although its May shipments of 1777 units were somewhat below the 2219 of May, 1930, and the 2600 of April, 1931, Cadillac-LaSalle is ahead of last year in the first five months of 1931, deliveries having amounted to 9572 cars this year, compared with 9052 in 1930. Auburn set an all-time record in May, with 6717 cars shipped. Graham-Paige took a spurt last month, with 4005 cars produced, the gain being attributed to assemblies of its new Pros-

May motor car production in United States and Canada put at 338,307 units by National Automobile Chamber of Commerce, leaving April, with output of 352,867 cars, as the peak month of the year.

\* \* \*

Chevrolet made 113,852 cars in May; Ford, 102,095. In the first five months of 1931, Ford manufactured 459,312 cars; Chevrolet, 437,317. Ford's proportion of the industry's total this year is 33 per cent against 42 per cent in 1930; Chevrolet's 31 per cent against 23 per cent last year.

\* \* \*

Some of May's bright spots—Chevrolet made highest number of cars since July, 1929; Auburn set an all-time production record; Oakland-Pontiac had biggest month since August, 1929. Cadillac-LaSalle and Studebaker are ahead of last year's performances.

\* \* \*

Maintenance of dealer organizations is automobile industry's most important problem. Some executives see direct selling as ultimate outcome of present predicament.

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perity Six. Hupmobile and Oldsmobile sagged to 2154 and 6500, respectively, from their high marks of April. Packard and Hudson have been laggards in output, but these two makers do not publish their production figures. Reo accounted for 1737

cars in May; with its new Flying Cloud sixes and eights and its new low-priced Speed Wagon trucks it should show a substantial improvement in June.

### June and July Hold Little Promise for Steel Makers

**S**O far as steel specifications from the automobile industry are concerned, however, June and July hold little promise. Following the premature contraction of retail sales the middle of May came a quick downward readjustment of production, which apparently has not halted. Even Chevrolet, which admittedly is making the most spectacular showing of the year, is said to have a tentative schedule of 84,000 cars this month and 70,000 in July, a considerable decline from last month's performance. Ford's June fortunes are an unknown quantity, and it would be useless and probably far wide of the mark even to venture a guess as to its output, except to say that it undoubtedly will fall far short of 100,000 cars. There is scarcely a company which has not already curtailed activities and, as the summer progresses, the "slide-off" will become more pronounced. Nash probably will be an exception, as it will bring out a new line of cars some time during the summer months.

It will be recalled that in July, 1930, there was a rather wholesale suspension of operations by a number of companies due to taking of inventories and to the absence of an incentive, in the form of a spirited retail demand, to maintain uninterrupted production. It is expected that there will be a duplication of this condition next month. Motor car executives seem convinced that there is little hope of halting a seasonal downward trend in retail trade, which is ac-



centuated in certain sections of the country by a distressing economic situation. New England, probably the first to feel the depression, has been the first to recover its buying power. Automobile sales through the Northeastern area have offset in some measure the inability of other districts to purchase new cars at the moment. The blackest spots on the retail sales map are the South and the Mississippi Valley, where improvement is not looked for until crops have been harvested and people once more have some money to spend.

#### Contest Between Chevrolet and Ford for Supremacy

WITH Chevrolet having assembled 11,757 cars more than Ford in May, all eyes are directed toward the contest between these two leaders. In the first five months of 1930 Ford made 797,474 cars, or 40 per cent of the industry's total; in the same period this year it turned out 459,312 cars, or 33 per cent, a drop of 7 points. In the entire year 1930 it manufactured 42 per cent of all the cars produced, so that its loss in 1931 has really been 9 points instead of 7. While Ford has made only 57 per cent of the cars this year that it made last year, Chevrolet's volume in 1931 has almost matched Ford's—437,317 units for Chevrolet, 459,312 for Ford. Its proportion of the industry's output has jumped from an average of 23 per cent for the year 1930 to 31 per cent in the five months of this year, a gain of 8 points. It is unreasonable to believe, therefore, that Mr. Ford will be content to continue to give ground or to allow the status quo to be maintained without making a vigorous effort to regain supremacy. Developments at the Rouge plant support this assertion. It is understood that steel mills and other suppliers have been requested to complete commitments on present contracts before the end of June, with apparently no fresh buying in evidence for July. There may be no steel purchases this month; if any should be made, it is not likely until the final week.

Third quarter steel prices have been quoted to two large automobile companies, which will shortly close for their requirements. It is said that the quotations show that efforts to raise hot-rolled strip steel \$1 a ton are not proving successful. With no chance of steel prices advancing in the immediate future, neither motor car manufacturer is in a hurry to place contracts for the coming quarter.

#### Problem of Trade Is to Keep Dealer Organizations Intact

ALVAN MACAULEY, president of the National Automobile Chamber of Commerce and also president of the Packard Motor Car Co., put his finger on the automobile industry's sorest spot when he said last week that "our problem is to keep our distributor and dealer organizations strong enough so that they will

emerge from the depression with unimpaired vitality. The unexpected protraction of this depression is making that object constantly more difficult." He further stated that the depression is proving to be a dangerous thing because of "wicked and destructive trade practices which have crept in as a result of the buyers' market which exists."

Mr. Macauley's frank pronouncement brings to mind the deplorable dealer situation which confronts the industry. Although there probably is no way of obtaining an accurate check, one authority claims that only 25 per cent of the country's dealers are free from financial embarrassment. There is scarcely a manufacturer who today is not putting major attention on the problem of trying to hold together a strong dealer organization. General Motors has been among the most progressive in this direction. However, some of the industry's executives believe that the factories have offered succor to dealers too late. They left them to their own devices in good times and did little for them until the depression plague fell upon them with devastating effect. Efficient dealers, who are experienced in automobile merchan-

dising and at the same time financially responsible, cannot be created overnight. These doubting executives feel that the industry is moving faster than it possibly realizes toward direct selling of its products. Factories have almost eliminated distributors from the merchandising picture, having taken over wholesale distribution of cars themselves. Through their own bad business practices and long neglect on the part of manufacturers, dealers are rapidly being eliminated. The only way out of the situation is for the automobile factories to sell their own output at retail.

A Midwest automobile maker outside Detroit is reported in the hands of a creditors' committee. This follows close upon the Jordan receivership and the abandonment of motor car manufacturing by the Gardner company. It is freely predicted that one or two other companies will pass from the active ranks in a short time.

The first Hupmobile to be produced in the new Canadian plant of the Hupp Motor Car Corp. at Windsor came off the assembly line on May 28. Graham-Paige has organized a Canadian subsidiary, with a plant in Windsor to take care of the Canadian trade.



Courtesy of New York Herald Tribune

#### PROGRESS IN GERM ISOLATION

The Iron Age, June 11, 1931—1927

## Self-Propelled and Operated Dump Car

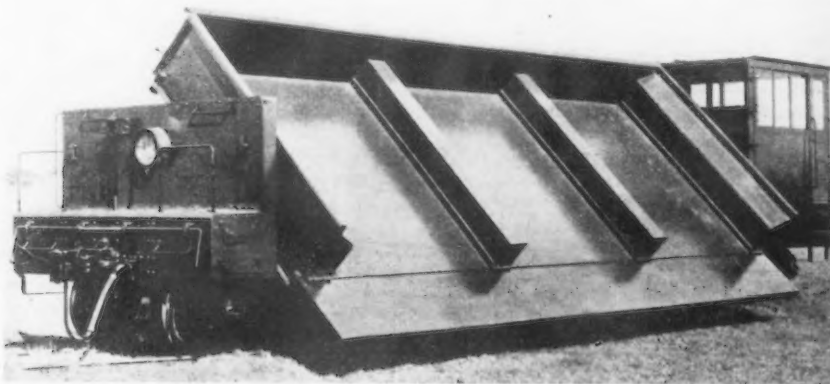
A SELF-PROPELLED dump car intended for service in open-pit mining and quarry work, as well as in industrial plants, and consisting of a locomotive chassis with a dump body mounted on it, has been brought out by the Differential Steel Car Co., Findlay, Ohio. The unit is self-contained and carries its own power plant.

It is designed to fill the need for an economical self-propelled vehicle for temporary operations, such as stripping the overburden from an ore body and similar work where it would not be desirable to set poles and string trolley wire, or to provide substation facilities. Such a vehicle is suitable also for use around foundries, mills and industrial plants, where it is advantageous for switching loaded and empty cars, and for the disposal of waste.

Shown in the accompanying illustration, the unit has a 24-yd. level-load dump body. The truck and frame construction has all the features of a locomotive and the dump body allows for a payload to be hauled on the locomotive as well as on trailer cars. The locomotive alone may be used for stock piling and a variable tractive effort may be obtained by varying the load on the body.

It is not necessary, under the light-load conditions, to carry the maximum weight on the locomotive. The unit weighs 45 tons light and 80 tons loaded. The air brake equipment is Westinghouse combination straight and automatic, with Gardner-Denver 60-ft. compressor belted from each engine, giving an air capacity of 120 cu. ft. a minute. Truck centers are 29 ft. apart and wheel centers, 5 ft. 6 in.

Mounted between the center sills, the power plant is thus protected in every way from falling material. Radiators of the sectional type are mounted along the side sills and blown by centrifugal fans through holes in the side sills. Essentially this particular unit consists of a double power plant equipment mounted on a sling between the sills.



Pay load can be carried on the self-dumping locomotive unit, as well as on trailers.

Electrical equipment comprises the apparatus necessary for transmission of power from internal combustion engines, the source of power in this type of locomotive, to the driving wheels. It also provides a means of efficiently controlling the speed, tractive effort and acceleration of the unit.

Operation of this locomotive is extremely simple and convenient. The scheme of control provides a maximum tractive effort during the first part of the acceleration at low speed, and yet provides also for a higher locomotive speed when high tractive effort is no longer required. All starting and stopping of engines, and starting and stopping, reversing, accelerating and dumping of the locomotive, are done from the operator's station.

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## Boston Scrap Dealers Urge Lower Freight Rates

A proposal to increase the minimum carload weights of scrap, in return for a reduction in freight rates, was made at a meeting of the Boston chapter of the Institute of Scrap Iron and Steel. It was suggested that the minimum weights be increased to 25 or 30 tons, against the present 20 tons minimum on most items of scrap and that a reduction in freight rates of 25 per cent be proposed to the railroads. It was pointed out that New England pays relatively higher rates on its scrap shipments than many other sections of the country. The proposal will be further studied by a special committee of the chapter.

In a discussion of the cost of scrapping automobiles, one firm reported that in a recent test, to determine whether any profit could be made out of the scrapping of automobiles, cars were bought at \$5 each, and the net result was a loss of approximately \$5 on each car under present market conditions and high freight rates. Another firm reported that it is paying not more than \$1 a ton for old cars and that under present conditions it has been unable to net any profit, despite the high percentage of non-ferrous metals in certain models.

## Copper Output Declined 30 Per Cent in 1930

Smelter output of copper in the United States in 1930 is reported by the Bureau of Mines at 1,394,389,327 lb., a drop of a little more than 30 per cent from the 1929 total of 2,002,863,135 lb. Refinery production of new copper showed a smaller decline, at 21 per cent, from 2,740,112,376 lb. in 1929 to 2,157,059,178 lb. in 1930. Going against the general trend, castings showed a gain of nearly 70 per cent, but remained less than 1 per cent of the total.

Imports of unmanufactured copper dropped from 974,312,201 lb. to 817,154,236 lb. Exports of metallic copper dropped similarly from 992,895,119 lb. to 753,114,927 lb.

Average prices are given as 17.6c. for 1929 and 13c. for 1930. The total value of smelter production from domestic ores shrank almost 50 per cent, from \$352,504,000 to \$181,271,000.

Arizona continued to lead in total output, with 41 per cent of the 1930 smelter production, against about the same ratio in 1929. Utah, Montana, Michigan, Nevada and New Mexico followed, in that order, all with much smaller totals than that of Arizona.

Domestic consumption of copper, taking account of stocks, etc., is given as 1,265,016,702 lb., of new refined material, compared with 1,778,585,415 lb. in 1929.

Exports in 1930 went more largely to Great Britain and France than to any other countries. Germany and Italy were third and fourth largest export markets. Sizable quantities went also to Canada, the Netherlands, Belgium, and Sweden.

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## Employment at Cleveland Off Slightly in May

Employment in metal-working plants in Cleveland during May fell off 2.1 per cent, compared with April, according to the monthly report of the Cleveland Chamber of Commerce, based on 42 representative plants, including foundries, machine shops and forging and stamping plants. Total number of employees for May was given as 15,572 compared with 15,904 for April and with 16,191 in March.

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## Public Works Contracts Total \$1,650,826,107

WASHINGTON, June 8.—Contracts for public and semi-public construction projects totaling \$27,879,756 were reported last week to the President's Emergency Committee for Employment. The addition of this amount brought the total value of contracts reported since Dec. 1, 1930, to \$1,650,826,107.



# PERSONALS

J. J. KENNEDY has been elected vice-president in charge of sales for the National Tube Co., Pittsburgh, succeeding JOHN H. NICHOLSON, who has retired. D. H. RAMSBOTTOM has succeeded Mr. Kennedy as general manager of sales for that company. HOMER C. GERWIG and W. F. MCCONNOR have been made assistant general managers of sales, and JAMES B. GRAHAM has been transferred from the superintendency of field work and inspection to the general sales department in charge of field work.

Mr. Kennedy has been general manager of sales for the National Tube Co. for 22 years. He was born at Albany, N. Y., and began his business career with the General Electric Co., Schenectady, N. Y., with which he was identified from 1896 to 1901. In 1901 he was employed for a time as chief clerk for the New York State National Bank, Albany, but went with the United States Steel Corp. in the same year as secretary of the Credit Managers' Association. He went to Pittsburgh in 1903 as credit manager for the National Tube Co., remaining in that capacity until his appointment as general manager of sales in 1909.

Mr. Ramsbottom has been identified with the Tube company for the greater part of his business career, having entered its employ at National works, McKeesport, Pa. He served in other capacities before entering the sales department, and has served as assistant general manager of sales for about 20 years.

Homer C. Gerwig is a native of Pittsburgh and attended Lehigh University, Bethlehem, Pa. He entered the engineering department of the National Tube Co. in 1910, where he remained for five years before joining the general sales department. He has been engaged in sales activity continuously since that time.

W. F. McConnor was born at Baltimore, Md., and attended Baltimore Polytechnical Institute and Lehigh University. Before joining the National Tube Co. as a designer in 1915, he served for two years in the erection department of the York Mfg. Co. In 1917 and 1918 he served in the engineering department of the National organization, and later as construction engineer at Christy Park, Pa., works. After a short time in the company's engineering department, he returned to Christy Park in a construction capacity, and in 1920 became assistant superintendent of that plant. Since 1922 until his recent appointment he has served as an operating engineer in the company's general offices at Pittsburgh.



J. J. KENNEDY

J. B. Graham, who joins the sales department as superintendent of field work, was born at Connellsville, Pa., and attended Tarkio College, Missouri, later taking up mechanical engineering work in an Eastern college. He went with the National Tube Co. in 1905 in the inspection department at Lorain, Ohio, works, and in 1909 was made chief inspector of that plant. From 1917 until 1922 he worked out of the office of the general superintendent of the company as representative in the oil fields of Wyoming, Montana and Oklahoma. He continued in the general superintendent's office until 1924, when he was made assistant to T. D. DAVIES, assistant to the vice-president of the company. During 1929 and 1930 he has been engaged in the general offices as superintendent of field work and inspection.

HOWARD P. ZELLER, general manager, Jamison Coal & Coke Co., Greensburg, Pa., was elected president of the Eastern States Blast Furnace and Coke Oven Association at its annual spring meeting held at the Wildwood Country Club, Pittsburgh, on June 5. J. T. WHITING, Hamilton Coke & Iron Co., Hamilton, Ohio, was named vice-president, and H. M. CROSETT, superintendent of coke ovens, Cambria works, Bethlehem Steel Co., Johnstown, Pa., secretary-treasurer.

DR. A. B. KINZEL, research metallurgist, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., discussed "Recent Develop-

ments in Engineering and Structural Alloy Steels" at the June meeting of the New York chapter of the American Society for Steel Treating, held in the assembly rooms of the Merchants' Association of New York, June 8.

MYRON C. TAYLOR, chairman of the finance committee of the United States Steel Corp., New York, has been given the degree of Doctor of Humane Letters by Hobart College.

H. G. CHASE has been appointed sales manager of the Standard Alloy Co., Cleveland. He was formerly with the General Alloys Corp.

GEORGE B. GARRETT, sales engineer of Arthur G. McKee & Co., Cleveland, sailed June 6 for England, where he will remain several months representing his company. The McKee company recently formed an association with the Whessoe Foundry & Engineering Co., Ltd., Darlington, England.

A. D. HUNT, formerly manager of engineering at the South Philadelphia works of the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been transferred to the company's Chicago office, and will be engaged in steam apparatus activities in the western districts.

ROBERT W. AYER, formerly connected with the engineering department of the Granville Brothers Aircraft Corp., Springfield, Mass., is now with the engineering department of the Stinson Aircraft Corp., Detroit.

D. J. QUAMMEN, who has been identified for the past five years with the Philadelphia office of Cutler-Hammer, Inc., Milwaukee, has been appointed manager, succeeding F. J. BURD, who has been made assistant manager of the Chicago office.

R. A. DADIEMAN, supervisor of general advertising for the American Rolling Mill Co., Middletown, has been elected chairman of the Cincinnati Association of Industrial Marketers. FRED G. BERLING, of the Lunkenheimer Co., was reelected vice-president, and W. J. HENGHELD, of the Lodge & Shipley Machine Tool Co., secretary-treasurer.

GEORGE F. NEWELL has been made vice-president and general manager of



the Pyrometer Service & Supply Corp., Cleveland, a subsidiary of the Claud S. Gordon Co., Chicago, pyrometer and industrial X-ray engineer.

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HAROLD J. PAYNE, who has been for the past year assistant managing director of the Associated Business Papers, New York, has been appointed secretary.

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RICHARD T. CRANE, JR., president, Crane Co., Chicago, was conferred the honorary degree of Doctor of Laws by Hobart College on June 8.

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FRANK D. CHASE, consulting engineer, Chicago, has been elected president of the Western Society of Engineers.

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ROBERT McMILLAN, purchasing agent for the Pittsburgh Steel Co., Pittsburgh, and subsidiary companies, will retire on July 1, following 45 years' activity in the steel and related industries. He entered the purchasing side of the industry in 1886 as assistant purchasing agent for the H. C. Frick Coke Co., holding that position for 10 years. He was later appointed district purchasing agent for the American Steel & Wire Co. at Pittsburgh, where he remained for 11 years, leaving that position in 1910 to become purchasing agent of the Pittsburgh Steel Co. Mr. McMILLAN will be succeeded by ALBION BINDLEY.

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GEORGE GORDON CRAWFORD, president, Jones & Laughlin Steel Corp., Pittsburgh, received the honorary degree of Doctor of Science from the Georgia School of Technology, Atlanta, Ga., at its commencement exercises on June 8. Mr. Crawford was graduated from this institution in 1890, later taking up further technical work at the Carl Eberhard University in Germany.

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W. J. PARKER has been appointed commissioner of the Forging Manufacturers' Association, 7 East Forty-fourth Street, New York, succeeding G. H. WEILER.

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ALBERT E. GROVER, industrial engineer, National Machine Tool Builders' Association, and THOMAS B. FRANK, treasurer, Cincinnati Planer Co., Cincinnati, will conduct the entire session assigned to the Cincinnati chapter, when several thousand accountants and industrial engineers gather at the William Penn Hotel, Pittsburgh, for the twelfth international cost conference of the National Association of Cost Accountants, June 15 to 18.

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HENRY W. PHELPS, president, American Can Co., New York; W. E. TAYLOR, general manager, New York; K. S. BRECKENRIDGE, Chicago, vice-



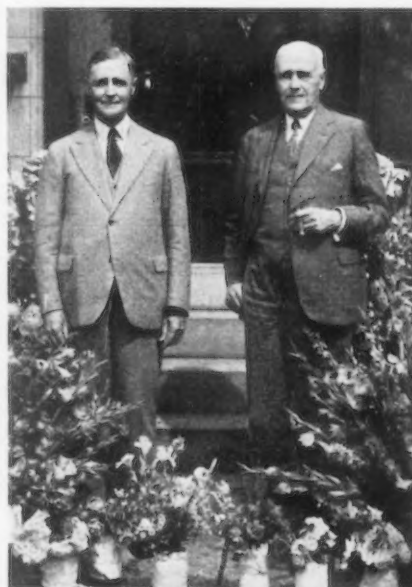
Harry L. Brindle, as announced in these columns last week, has been made general superintendent of the Farrell, Pa., works of the Carnegie Steel Co.

president, and other officials were guests June 5 at Terre Haute, Ind. Mr. Phelps and his party went there to attend the formal opening of the new plant of the company and to attend a dinner in their honor given by the Chamber of Commerce.

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## Ludlow-Saylor Wire Co. 75 Years Old

The Ludlow-Saylor Wire Co., St. Louis, has completed 75 years of continuous operation.



Edwin J. Gould and Frank Low, who have completed 50 and 40 years of service respectively with the Ludlow-Saylor Wire Co., St. Louis.

Frank Low, vice-president and general sales manager of the company, and Edwin J. Gould, vice-president and general superintendent in charge of operations at the large wire cloth plant on Newstead Avenue in St. Louis, were recently honored by their fellow workers with many floral tributes and other expressions of esteem, on the occasion of their fortieth and fiftieth anniversaries in the service of this company.

Mr. Low went to St. Louis as secretary and treasurer of the company in 1891 to take charge of the sales, and has served continuously for 40 years as head of the sales department. He was elected vice-president about 1896. He has covered most of the United States in promoting the sale and distribution of the wire cloth and screens manufactured by his company. Prior to taking charge of the sales of the Ludlow-Saylor company, Mr. Low spent eight years traveling the Pacific Coast territory for W. W. Montague & Co., San Francisco.

Mr. Gould entered the employ of the company in 1881 and was advanced from one position to another until his appointment as general superintendent. He was formerly connected with Gould & Hegney, who operated a rope factory in St. Louis, and who are said to have made the first wire rope in that vicinity.

The personnel of the Ludlow-Saylor company includes a number of men who have been in its employ continuously from 25 to 40 years.

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An increase in jobs filled and a decrease in the number of applicants are reported by the general superintendent of the Illinois free employment office. Applicants totaled 2322 and jobs filled totaled 885 for the week ended May 30, compared with 2595 applicants and 844 jobs for the previous week. During the same period a year ago there were 1711 applicants and 712 jobs were filled.

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Sales in 1929 by 72 establishments engaged primarily in making cast iron pipe and fittings totaled \$80,251,000, of which \$45,808,000, or 57.1 per cent, was to industrial users, while sales to wholesalers amounted to \$29,686,000, or 37 per cent, and sales to manufacturers' wholesale branches were \$4,757,000, or 5.9 per cent, according to the Bureau of the Census.

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A Cuban presidential decree issued on Wednesday of last week provides for a reduction of seven-tenths of the regular duty on industrial machinery when imported for the establishment of new industries, says a cablegram from Acting Commercial Attache Albert F. Nufer, Havana.

## Model to Demonstrate Drop Hammer

THE Erie Foundry Co., Erie, Pa., is demonstrating the advantages of its type M, motor-driven board drop hammer by means of a working model mounted on an automobile truck and taken directly to the office or plant of the prospective purchaser.

This method of demonstration is particularly appropriate because one of the principal features is self-contained construction that permits locating the machine anywhere in the shop without alining it with the walls or other hammers. The working model, in taking power from any convenient light socket, demonstrates effectively the simplicity of the installation of the larger self-contained hammer, which, similarly, merely requires connection to the power line.

The model is patterned after a 3000-lb. hammer, the dimensions being reduced in the ratio of one to four. The ram of the model weighs about 50 lb. and the weight of the complete hammer is about 1800 lb. Knowing that weight will vary as the cube of the linear dimensions, it is interesting to note that the weights of the model are almost exactly one sixty-fourth of the weights of the large hammer, indicating how faithfully every detail has been copied.

The guides of the model are adjustable, the frames can be shifted across the anvil for alining the dies and take-up gibs are provided between the frames and the anvil in the front and back direction. The latch is adjustable so that the point of knock-off can be varied while the hammer is in operation, and the usual adjustments are provided for the rolls and clamps. The motor is mounted on a spring cushion arranged to take care of the recoil so that the model motor is just as effectively protected against shock as in the full size ham-

mer. A special feature, not found in the full size hammers, is a plate glass window in the side of the gear case; this was necessary in order to demonstrate the working of the gears. Gears, as well as the flywheel, are entirely inclosed and operate in a bath of oil. The small gears are heat-treated and hardened the same as their larger counterparts.

The model hammer, mounted on the truck as shown in the illustration, is now on a tour of the principal drop forging centers, Ralph H. Tyler of the Erie company having charge of the demonstration.

## Newton Concentrating Operations at Monroe

The Newton Steel Co. has concentrated production of sheets at its Monroe, Mich., property, because of the low costs developed at this plant, and has suspended operations at its mill at Newton Falls, Ohio. Plans are being considered for the installation of tin mill equipment at Newton Falls, at a cost of \$1,000,000, according to President E. F. Clark.

Newton is shipping much steel from its Monroe plant by motor truck, and is also preparing to receive sheet bar shipments from Chicago and Cleveland by water. Outbound shipments of steel will also be made via water to Buffalo and to the automobile body plants in Cleveland, thus effecting sizable savings in transportation charges. A suitable dock for the property is now being completed.

Granite City Steel Co. has reduced the dividend rate on its common stock to \$2 annually from the previous \$3 rate. The board of directors has voted a quarterly dividend of 50c. a share, payable June 30 on stock of record June 15.



## OBITUARY

JOHN OLIVER HENSHAW, dean of American pig iron brokers, died at his home in Cambridge, Mass., June 7, aged 74 years. He was graduated from Massachusetts Institute of Technology in 1878, later attending the University of Michigan. His first pig iron connection was with N. S. Bartlett & Co., Boston. Later he became identified with Hickman, Williams & Co., Philadelphia. In recent years he had engaged in business for himself, representing Alabama furnaces.

EDWARD W. PUTNAM, vice-president and general manager, Kelly Reamer Co., Cleveland, died June 1 in a Springfield, Ohio, hospital from injuries received in an automobile accident. He was 30 years of age.

ALBERT G. BIERBACH, for many years engaged in the machine shop business in Milwaukee, died May 30, aged 78 years. He was born in Milwaukee and more than 50 years ago, in association with his brother, the late R. C. Bierbach, established a shop to manufacture a number of important new designs, including what is said to be the first inclosed fire escape and the first adjustable door-hanging device for freight cars. Mr. Bierbach retired about 10 years ago.

W. M. RYNERSON, New York representative for the last 14 years for the Carter Bloxonend Flooring Co., Kansas City, died of a heart attack in New York, May 29, aged 69 years. He was widely known among the trade in the district he served.

HOWARD J. MEHL, traffic manager of the Diamond Chain & Mfg. Co., Indianapolis, died of a heart attack recently at his home, at the age of 43 years. He was born in St. Louis and settled in Indianapolis 35 years ago. He had been with the Diamond Chain company for 25 years.

Stockholders of the Wheeling Steel Corp., Wheeling, W. Va., at a special meeting held on June 2, ratified the proposed change in financial structure approved recently by the board of directors. Under the terms of the proposal, one share of the 8 per cent preferred stock will be exchanged for 1½ shares of new 6 per cent preferred \$100 par value stock; one share of 10 per cent preferred stock will be exchanged for 1½ shares of new 6 per cent preferred cumulative \$100 par stock, and one share of \$100 par common stock will be exchanged for one share of new common, no par value.

(ESTABLISHED 1855)

## The Prospect

LET us look at the prospect in a low-brow way. The present outlook is for good crops in this country. This will give more income to the farmers and more business to the railways. There is much evidence that the stocks of consumers' goods have been drained low. These will have to be replenished. There is therefore a reasonable expectation of some revival in business in consumers' goods.

On the other hand people do not eat or wear iron and steel, copper, lead and zinc. Those go mainly into constructions. The building of houses is the main form of construction. The individual house does not require a great quantity of copper and steel in itself, but every house spells more telephones, electric transmission, generators, automobiles, etc. Every house therefore means the use of far more steel and copper than go into its own cubic contents.

The outlook for house building is not yet very good, although we need more houses. Our building statistics summarize permits to build. Consummation is on the average about six months later. Contracts for material may be placed soon after the permits are filed. Delivery and use come later. The building statistics are therefore in themselves a forecast. They are not yet encouraging.

Credit is easy. The enormous over-subscription of the Government loan is evidence. But try to borrow for a long-time building mortgage! The lender will not let his credit go into high cost building. Nor will the person who does not have to borrow. Bricklayers are reported to be laying more bricks per hour, but even so the ordinary newly married couple can not afford to pay them so much per hour as they demand.

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## The Cost of Copper

ACCORDING to the Census report for 1929 the wages paid for the mining and milling of copper ore in the United States in that year was about 65 million dollars, exclusive of salaries. The cost of materials, including fuel and purchased power, was a little more than 59 million. According to the United States Bureau of Mines, the ore that was mined yielded an average of 28 lb. of copper per ton and a total of 1,928,000,000 lb. This gives us an average of 3.36c. a lb. for wages and 3.09c. a lb. for materials, a total of 6.45c. a lb. General expense, including administrative salaries, local taxes, etc., may have added 1.5c. a lb. to this, bringing a total of 8c. a lb. for copper in concentrates. A curtailed rate of production in 1930 increased this quotient substantially. A reduction of wages in 1931 then reduced it somewhat.

In 1929 for the smelting, freighting and refining of 563,000,000 lb. of copper, the Utah Copper Co. and Nevada Consolidated experienced a cost of 2.5c. a lb. of copper and a selling expense of about 0.15c. This makes a bare cost of about 10.65c. Depreciation of plant and depletion of mines are additional charges. Finally the industry expects to get a reasonable return on the large capital that it has invested in mines and plant.

In comparison with the average there are, of course, maxima and minima. The highest cost producers, regarding great groups, are perhaps those of the Lake Superior district. For them the Michigan State appraiser of mines reckoned for 1930 an average cost of 12.5c., including depreciation, but ex depletion. The large producer at lowest cost may be the Utah Copper Co. Its cost in 1930 was 8.5c. per lb., ex depletion. This makes it reasonably clear that the present price of 8¼c. for copper is not going to prevail indefinitely. At such a price we should soon cease to have any copper.

So it is with many other commodities. Zinc, rubber, sugar, coffee, gasoline, etc. They have been sacrificed at less than the cost of production for the reason that producers have felt constrained to steer between the Scylla of heavy shut-down expense and the Charybdis of producing at a loss. When treasury reserves are gone, however, there is no longer any option. As they now look backward there are many producers who see that it would have been better for them to have ceased production a year ago.

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## The Illusion of "Pre-war" Prices

RECENT declines in commodity prices have brought index numbers to the neighborhood of the undeservedly famous "1913 average" and it is time that a warning of its futility be sounded. It is merely a phrase to speak of "pre-war prices" and use 1913 as the basis. Early in 1919 Prof. Irving Fisher said that to talk about "pre-war prices" was to talk in a dead language, and the course of affairs afterward justified his position.

Nowadays, however, it is not a matter of talking in a dead language. There are dead languages that can now be spoken and understood, for they left us literary legacies of what was good form. The pre-war period left us no such legacy as to prices, for 1913 is one thing, the five years ended with 1913 is another thing and the ten years ended with 1913 is still another. Whatever of these periods is picked out is going to be different from the other periods. By the old series of the Department of Labor, 1913 was 4 per cent above the five years pre-



ceding and 13 per cent above the five years before that. It was just 50 per cent above 1896 and 1897, if one wants an extreme case.

To talk of 1913 prices is not to talk in a dead language but to talk in one little old dialect. The dialect would be forgotten and 1913 should be forgotten or should be referred to only in the way it deserves. It is of very little significance that in the present Department of Labor series, with 73.3 issued as the number for April of this year, 1913 stood at 70. We are 5 per cent above 1913, as a statistical fact, but any reference to our being 5 per cent above pre-war is meaningless for present-day applications. The important fact is that declines have recently occurred; they have been usually between one and two points a month, totaling 17.4 points in 12 months and 24.2 points in 19 months.

These long-range comparisons would be of little use if the averages, which are weighted with ample accuracy from a scientific viewpoint, were made up of coherent elements, but they are not. The numerous commodities which make up the average have moved variously. Reference was just made to 1896 and 1897 prices. Today automobile prices figure in no small way in the weighted index. How did they figure in 1896? This is a simple way to bring out a point, that other things being equal prices ought to be declining all the time, as we make progress in equipment and methods. If one wanted to construct a theoretical average for 1896 he might estimate what it would have cost to build automobiles in accordance with the present designs; that cost would be enormous, whereby the decline in automobile prices 1896 to date would likewise be enormous.

Short-range changes in the general commodity index tell little about individual items but they are quite a good measure of the total amount of disturbance to trade caused by falling prices. Suppose the index goes down 15 points in a year and each commodity has gone down 15 points. That makes a certain sum total of disturbance. Suppose instead that half the commodities go down 30 points and the other half do not change. The sum total of business disturbance would be much the same.

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## On This Question of Tariff

**W**E have been told by foreign visitors, by foreigners who are not visitors, and by American "internationalists" that the one thing needed to restore business prosperity is a drastic lowering of the United States tariff. Not so much seems to be said about foreign tariffs—it is the American levy which is the sprag in the wheels of commerce.

Let us look at a few tariff facts. In the first place, reports of the United States Bureau of Foreign and Domestic Commerce show that only 32 per cent of the goods imported into this country are subject to any tariff impost whatsoever. The remaining 68 per cent comes in entirely free of all duty.

According to the Statesman's Yearbook, several other countries have tariffs averaging substantially higher than that of the United States. The 1930 issue

shows customs collections of the United States at 14.03 per cent of the imports, against 14.80 per cent for Canada, 20.2 per cent for both Australia and India, 19.3 per cent in Cuba, and as high as 32.9 per cent for Argentina.

Even Great Britain, which is hailed as the great "free trade" country of the world, levies duties reaching 9.77 per cent, or more than two-thirds the figure for the United States. Of those countries which have tariffs lower than the United States, Germany stands at 10.02 per cent, Italy 6.78 per cent, Japan 6.80 per cent, Sweden 8.63 per cent and South Africa at 11.39 per cent.

There are no provisions in our tariff bill making absolute exclusion of foreign goods, such as those adopted by both Australia and Brazil during the past year.

The figures do not make much of a case for the American tariff smashers.

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## Everyday Steel Needs

**T**HIS country is still going, simply at a reduced rate. Certain activities, associated with the daily life of the people, are off somewhat, while other activities, associated with expansion or construction, are off a great deal. That the country is going is illustrated for instance by freight car loadings and bank debits. Food and clothing are moving and contribute to both items.

The economist would make a distinction between "capital goods" and "consumption goods," concluding from past experiences that in a depression the former decreases a great deal, the latter only slightly. He would have difficulty in fitting what occurred during the first six or eight months of last year with this theory. When the stock market collapsed, four months after general business had started to recede, there was a large construction program and in December President Hoover secured various promises as to the program being carried out. Fears that many projects would promptly be abandoned may not have been altogether well founded. At any rate construction work was quite active for a time and afterward it began to recede.

There was a time when by far the major part of the steel, and preceding steel the wrought iron, was made for capital goods. It used to be said that about 50 per cent went to the railroads alone, and while that was probably an exaggeration it is clear that the total of all iron or steel for capital goods was very high. Then railroad requirements became relatively light but buildings and bridges assumed a high position. On the other hand steel came to be used much more in the household.

It is a fairly prevalent, but not universal, view that the proportion of steel going into "capital goods" has decreased in recent years, that the common everyday needs of the people are taking a larger proportion than formerly. There is room for argument both because it is difficult if not impossible to define the terms closely enough to suit everybody,

while it is impossible to trace all the steel to destination. Then there is the matter of upkeep. A power plant represents capital needs, but boiler tubes have to be replaced from time to time and that is current consumption. An old skyscraper may need new elevators.

Tin plate is likely to be picked out as the best illustration on a large scale of "consumption goods" in steel, production in 1929, a record year all around, being 4.8 per cent of our total rolled iron and steel output. This, however, does not represent an increase in our consumption of tin plate relative to other steel, for the fact is that in the three years prior to the McKinley protective duty, which went into effect July 1, 1891, our tin plate imports equaled

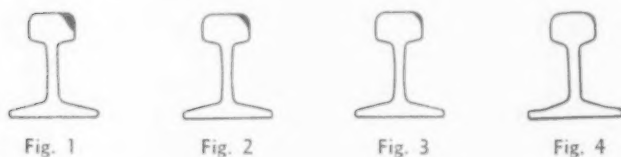
almost 6 per cent of our total production of rolled iron and steel, while furthermore we exported 13 per cent of our tin plate in 1929, a much larger proportion than in steel generally. Our tin plate consumption has not increased proportionally nearly as much as our total iron and steel consumption.

Tin plate, however, does conspicuously well in a period of depression. Sheets and merchant bars do relatively well. Structural steel, however, has had a remarkably high average since the recession began but it is not doing so well now. Although a construction material and representing capital goods, it would have no little vogue even in the worst times. In a way even strictly "capital goods" are involved more or less in common everyday steel requirements.

## Comparative Tests of Rails of Different Types

ON page 1834 of THE IRON AGE of June 4, appeared a brief article telling of tests of wearing qualities of steel rails made by the Swiss Railroad Administration some time ago. This article was published without the accompanying illustrations. These are given herewith, with the following data:

Fig. 1 represents the normal rail of 1926; Fig. 2, the normal rail of 1928; Fig. 3, a 1928 rail with



about 1½ per cent manganese; Fig. 4, a 1928 rail which had undergone heat treatment. The amount of wear is indicated by the blackened area at the upper right portion of the tread.

These rails are of 46 kg. weight (about 93 lb. to the yard). They were put into service under heavy traffic, not only in straight sections but also on curves and in tunnels. Each rail was studied after a service period of six months. They show progressive improvement, from Fig. 1 to Fig. 4, in resistance to wear.

## Let's Go Back to Arithmetic

(Concluded from page 1887)

who merely buries his entrusted talents for safe-keeping. Idle dollars bring home no bacon.

The ideal way in which to put these idle dollars fruitfully to work is to invest them in the increased profits to be made through modernizing American industry. Improvement in mechanization will multiply dollars more quickly and surely than any other means because it means cost saving and expansion of consumption. Many concerns, particularly the smaller ones, that could pay for the cost of equipment modernization out of increased

profits in a year's time cannot secure the money for the purpose because of the commercial banker's insistence upon the "fluidity" of loans. But even the most fluid loan can quickly become frozen when industry gets "cold feet." And we need the smaller buildings in our future skyline of industry as well as the big skyscrapers. The banker's viewpoint is changing somewhat in these matters and must change still more before a modernization program becomes an established fact.

Before long the committee of the whole, consisting of the many minds of business, industry and finance that are concentrating upon our present economic problem, will render their report. Not in formal fashion will this be done, but by the gradual crystallization in many minds of the fact that there is a simple, logical, tried and tested way out of our difficulties. We recommend to these many minds the study of the simple prosperity formula which when honestly and earnestly applied has never failed to work for the good of capital, labor and the public. It is bound to lead them to the truth so well known to men of industry, that improved machinery holds the secret of low cost production and increased per capita wealth.

Let's discard the higher mathematics and put simple arithmetic to work to build industry's new skyline.

## Statistical Abstract of the United States

A VOLUME of 876 pages, practically solid tables, with a 14-page table of contents and an 18-page index, represents the Statistical Abstract of the United States for 1930, this being the fifty-second number. It is published by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce. Copies may be had at \$1 each, from the Superintendent of Documents, Government Printing Office, Washington.

This volume brings up to date the great mass of statistical data covered in preceding volumes, and relating to the myriad activities of the people of the United States. It deals with production of a great number of commodities, the manufacturing census figures, business information of many kinds, area and population figures under many methods of analyses, and altogether most of the detailed information which the average student of economics, or of business movements, will need.

# MARKETS



## Automobile Industry Holds Key to Trend of Steel Output

▲ ▲ ▲  
**INGOT Production Now 40  
Per Cent—Coal Strike May  
Be Market Factor—Scrap De-  
clines at Pittsburgh and Detroit**  
▼ ▼ ▼

**T**HE automobile industry is chiefly responsible for a further decline in raw steel production from 42 to 40 per cent of capacity and it will strongly influence the course of ingot output in the next two months. Demand for iron and steel from other sources is holding fairly constant, suggesting that the irreducible minimum of requirements has been reached, but motor car manufacture has been receding steadily since the premature contraction of retail sales in May, and seems to be headed for a very low operating rate in July, with suspensions such as occurred a year ago a possibility.

These expectations, however, fail to take into account the sensitivity of motor car demand to changes in general business sentiment. If the automobile trade is justified in the belief that the recent stock market decline checked its retail sales, the later recovery of securities prices should have the opposite effect.

**B**UT regardless of automotive developments the steel industry sees nothing that will bring about a revival of activity in the next two months unless it be the coal strike. So far the strike is limited to relatively few mines in western Pennsylvania and West Virginia and is not regarded seriously. It is interesting to recall, however, that a coal strike in the same region came at the turning point of our last severe depression nine years ago, driving up prices of coke, pig iron and finished steel. For example, furnace coke which was quoted at \$3.25, Connellsville, at the beginning of April rose to \$7.50 before mid-year was reached.

Aside from possibly some narrowing of variations in beehive coke prices, the present disturbance has had no visible effect in any of the markets. Meanwhile, iron and steel producers are preparing for a dull summer by making every possible effort to cut operating expenses. Reductions in salaries and operating personnels have been made by some companies, and a number of the larger interests which had previously attempted to prorate work among their various plants have finally shut down at certain points and are concentrating at their low cost centers.

**P**RICES of finished steel are being given little test, since mills are not pushing forward contracting. Makers of sheets and strips will accept second quarter specifications until June 30 for shipment until the last day of July. As this means that many users will have enough steel to carry them well into August, there is little interest in third quarter contracts. Spot orders are still bringing out concessions in some products, notably in cold-rolled strip and galvanized sheets.

Scrap has given further ground at Pittsburgh and Detroit, heavy melting grade declining 50c. a ton at both centers. At Pittsburgh an important steel interest which had not bought for several months closed for considerable tonnage, and dealers made heavy purchases of railroad offerings, indicating their willingness to build up yard stocks at present market levels.

**T**IN plate is the most active among finished steel products, with output holding at 65 to 70 per cent. Producers expect 1931 production to compare favorably with the 1930 total, which fell only 8½ per cent below the 1929 peak. Operations of seamless and electric weld line pipe plants are still being stepped up, and sales of standard pipe from stock show an encouraging increase. The Insull interests of Chicago are in the market for 200 miles of 24 to 26-in. gas line, 35,000 tons, to be laid in Texas. Export inquiry for tubular products has improved. Fabricated steel awards of the week, at 48,000 tons, are above average proportions.

The downtrend of rail mill operations at Pittsburgh has been checked by heavier specifications. The Seaboard Air Line has ordered 6000 tons of rails from the Ensley mill. Chicago mills have booked 15,000 tons of car material. The Virginia Bridge & Iron Co. has placed 4000 tons of steel for car bodies to be built for the Norfolk & Western.

The Canadian tariff will not seriously affect American steel mills, since increases in duty are offset by reductions. Coke, however, which was formerly on the free list, was made dutiable at \$1 a ton.

THE IRON AGE composite price for heavy melting scrap has declined from \$9.67 to \$9.50 a ton. The finished steel and pig iron composites are unchanged.



# PITTSBURGH

## Cautiousness of Steel Buyers Predominant as Operations Lose Slightly

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**P**ITTSBURGH, June 9.—The steel market in the past week has been notably devoid of significant developments. A slight improvement in sentiment, possibly reflecting the recent strength in the security markets, is noticeable in some quarters, but buyers of steel have become far too cautious to be influenced by day-to-day happenings. Both producers and consumers generally recognize the fact that little activity can develop in the next two months. As a result, steel companies are making every possible effort to reduce operating expenses and, with one or two exceptions, reductions in salaries and operating personnel have been made throughout the district. All possible economies are also being made in mill operations, and some of the larger interests which have heretofore attempted to distribute work among all their various plants have finally suspended operations entirely at some points and are concentrating at their low cost centers.

Steel ingot production in the immediate Pittsburgh district has eased off fractionally, and is estimated this week at 40 per cent of theoretical capacity. The Wheeling district is also slightly lower at about 50 per cent. In the Valleys, curtailment at some points has been offset by advanced schedules at others, leaving the operating rate practically unchanged.

Finishing mill schedules also show more stability than has been reported in recent weeks. Tin plate output is holding, following several weeks of gradual curtailment, and current specifications indicate that the present rate of 65 to 70 per cent can be maintained throughout June. Sheet and strip mill operations are still somewhat intermittent, but most producers have now arranged fairly definite schedules of two or three days' operations a week, or are running regularly every other week. Production of rails and track accessories is still being adjusted downward to meet the lighter releases of the carriers, but output of the heavy hot-rolled products is fairly stable, with the most activity shown in structurals and reinforcing bars. Production of seamless and electric weld line pipe is still being stepped up, and small orders placed recently have enabled mills to round out schedules in a more satisfactory way than was possible with a few large orders unevenly distributed.

With the exception of a continued falling off in specifications from the automobile and particularly automobile parts makers, general demand

**Steel buyers still cautious, but flow of orders is fairly constant except from automobile industry.**

\* \* \*

**With outlook for continued dullness in next two months, renewed efforts are being made toward operating economies.**

\* \* \*

**Little interest in third quarter contracts, and prices for that period are not yet tested.**

\* \* \*

**Further decline in heavy melting steel scrap on fairly large sales.**

\* \* \*

**Coal and coke not seriously affected by strikes at coal mines.**

▼ ▼ ▼

for finished steel products is holding fairly constant. Orders are for minimum tonnages, but are reasonably regular.

Prices are being given little test, and mills show no inclination to push forward contracting. Third quarter books have not been opened, except in the case of hot-rolled strip steel, on which producers are attempting to advance the prevailing market \$1 a ton. Thus far the efforts seem to be meeting with some success. Sheet makers are still trying to stabilize prices preparatory to the introduction of new schedules of quotations, but in spite of this galvanized sheets are \$1 a ton lower, and 2.80c., Pittsburgh, seems to represent the top of the market. The present quotation on tin plate will be unchanged in the second half.

Buying of a fair-sized tonnage of No. 1 heavy melting steel at \$10.50 by a large consumer establishes this grade at a price 50c. under recent levels, but indicates a check in the recent price decline. The pig iron market has been without feature. Coal and coke have not yet been seriously affected by labor disturbances in the district.

### PIG IRON

No marked activity has developed in the last week. The inquiry for basic iron mentioned heretofore is still outstanding. Two or three steel companies with surplus iron are said to be negotiating for the sale, and one merchant interest is thought to be interested. The Westinghouse Electric & Mfg. Co., which has had an inquiry out for the second half requirements

of its Trafford City, Pa., and Cleveland plants, has postponed buying for several weeks. No other inquiry has come into the market, and current sales are generally for lots of 100 tons or less. The market on basic iron remains quotable nominally at \$15.50 to \$16, Valley furnace, with small lots occasionally bringing more. On foundry, malleable and Bessemer iron, no transactions are reported to justify a change in the current \$17, Valley, price.

Prices per gross ton, f.o.b. Valley furnace:	
Basic .....	\$15.50 to \$16.00
Bessemer .....	17.00
Gray forge .....	16.50
No. 2 foundry .....	17.00
No. 3 foundry .....	16.50
Malleable .....	17.50
Low phos., copper free....	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Prices per gross ton f.o.b. Pittsburgh district furnace:	
Basic .....	\$16.00 to \$16.50
No. 2 foundry .....	17.50
No. 3 foundry .....	17.00
Malleable .....	17.50
Bessemer .....	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

### SEMI-FINISHED STEEL

Transactions in raw steel are still generally lacking in this market, and consumers are apparently well covered for some time to come. Prices on billets, slabs and sheet bars are nominally \$29 to \$30, Pittsburgh or Youngstown, and forging billets continue at \$35. Some producers of wire rods have opened their books for third quarter at \$35, Pittsburgh or Cleveland.

### RAILS AND TRACK SUPPLIES

Releases of accessories thus far in June have been light, but the market is slightly more active from the standpoint of inquiry. Some of the smaller roads are inquiring for miscellaneous lots of accessories, although none of the larger carriers has come into the market thus far. In many cases third quarter buying may be indefinitely postponed in view of the operating difficulties of the railroads. Rail mill operations have tapered to a very low point for this season of the year, and prospects for additional releases in the next few weeks are not very good.

### BARS, PLATES AND SHAPES

Demand for the heavy hot-rolled products compares favorably with that for other finished steel lines, and seasonal influences have hardly been so pronounced. This holds true both in lines which might be expected to be considerably more active now and in the case of products which ordinarily ease off in the summer months.

# A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,  
Advances Over Past Week in Heavy Type, Declines in Italics

Fig Iron, Per Gross Ton:	June 9, 1931	June 2, 1931	May 12, 1931	June 10, 1930
No. 2 fdy., Philadelphia.....	\$17.26	\$17.26	\$17.26	\$19.76
No. 2, Valley furnace.....	17.00	17.00	17.00	18.50
No. 2, Southern, Cin'ti.....	14.69	14.69	14.69	16.69
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	18.50
Basic, del'd eastern Pa.....	17.00	17.00	17.00	18.75
Basic, Valley furnace.....	15.50	15.50	16.50	18.50
Valley Bessemer, del'd P'gh..	18.76	18.76	18.76	20.76
Malleable, Chicago*.....	17.50	17.50	17.50	18.50
Malleable, Valley.....	17.00	17.00	17.00	19.00
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, seab'd car lots.....	†\$5.00	†\$5.00	†\$5.00	94.00

\*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.  
†Ferromanganese quotations adjusted to carload unit; larger quantities sold at discounts.

Rails, Billets, etc., Per Gross Ton:	June 9, 1931	June 2, 1931	May 12, 1931	June 10, 1930
Rails, heavy, at mill.....	\$42.00	\$42.00	\$42.00	\$42.00
Light rails at mill.....	34.00	34.00	36.00	36.00
Rerolling billets, Pittsburgh..	29.00	29.00	30.00	31.00
Sheet bars, Pittsburgh.....	29.00	29.00	30.00	31.00
Slabs, Pittsburgh.....	29.00	29.00	30.00	31.00
Forging billets, Pittsburgh.....	35.00	35.00	36.00	37.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	36.00
Skelp, grvd. steel, P'gh, lb....	1.65	1.65	1.65	1.70

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.65	1.65	1.65	1.75
Bars, Chicago.....	1.70	1.70	1.70	1.85
Bars, Cleveland.....	1.65	1.65	1.65	1.75
Bars, New York.....	1.98	1.98	1.98	2.08
Tank plates, Pittsburgh.....	1.65	1.65	1.65	1.70
Tank plates, Chicago.....	1.70	1.70	1.70	1.80
Tank plates, New York.....	1.93	1.93	1.93	1.93
Structural shapes, Pittsburgh	1.65	1.65	1.65	1.70
Structural shapes, Chicago.....	1.70	1.70	1.70	1.80
Structural shapes, New York	1.90 1/2	1.90 1/2	1.90 1/2	1.90 1/2
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.70
Cold-rolled strips, Pittsburgh	2.15	2.15	2.15	2.45

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh..	2.15	2.15	2.15	2.55
Sheets, black, No. 24, Chicago dist. mill.....	2.35	2.35	2.35	2.65
Sheets, galv., No. 24, P'gh..	2.75	2.80	2.80	3.20
Sheets, galv., No. 24, Chicago dist. mill.....	2.90	2.90	2.90	3.30
Sheets, blue, No. 13, P'gh..	2.00	2.00	2.00	2.15
Sheets, blue, No. 13, Chicago dist. mill.....	2.10	2.10	2.10	2.25
Wire nails, Pittsburgh.....	1.80	1.80	1.90	2.15
Wire nails, Chicago dist. mill	1.50	1.95	1.95	2.20
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.35
Barbed wire, galv., Pittsburgh	2.55	2.55	2.55	2.80
Barbed wire, galv., Chicago dist. mill.....	2.60	2.60	2.60	2.85
Tin plate, 100-lb. box, P'gh..	\$5.00	\$5.00	\$5.00	\$5.25

Old Material, Per Gross Ton:	June 9, 1931	June 2, 1931	May 12, 1931	June 10, 1930
Heavy melting steel, P'gh....	\$10.25	\$10.75	\$11.25	\$15.25
Heavy melting steel, Phila....	9.50	9.50	9.50	13.00
Heavy melting steel, Ch'go....	8.75	8.75	8.75	12.00
Carwheels, Chicago.....	10.00	10.00	8.75	13.50
Carwheels, Philadelphia.....	12.00	12.00	12.50	14.50
No. 1 cast, Pittsburgh.....	10.25	10.25	11.00	14.25
No. 1 cast, Philadelphia.....	11.50	11.50	11.50	14.00
No. 1 cast, Ch'go (net ton)...	9.00	9.00	9.00	12.75
No. 1 RR. wrot., Phila.....	10.00	11.00	11.00	15.00
No. 1 RR. wrot., Ch'go (net)	7.50	7.50	7.50	10.50

Coke, Connellsville, Per Net Ton at Oven:	June 9, 1931	June 2, 1931	May 12, 1931	June 10, 1930
Furnace coke, prompt.....	\$2.40	\$2.40	\$2.50	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	8.37 1/2	8.62 1/2	9.62 1/2	13.12 1/2
Electrolytic copper, refinery..	8.00	8.25	8.75	12.75
Tin (Strait), New York.....	22.45	22.45	23.12 1/2	30.37 1/2
Zinc, East St. Louis.....	3.25	3.25	3.27 1/2	4.60
Zinc, New York.....	3.60	3.60	3.62 1/2	4.95
Lead, St. Louis.....	3.60	3.60	3.60	5.40
Lead, New York.....	3.75	3.75	3.75	5.50
Antimony (Asiatic), N. Y....	6.20	6.30	6.60	7.10

Releases of structural material and reinforcing bars are rather well sustained, and new inquiries are still in good volume. Awards, however, are rather slow in coming out. In the immediate Pittsburgh district, early action is expected on highway and boulevard work which will involve fair-sized tonnages of both structural and reinforcing bars. The Tenth Street bridge at Pittsburgh is not yet out for bids. No new barge inquiry is appearing, and two large purchases on which action had been expected in the near future have been delayed indefinitely.

Nothing of importance has developed in the way of price schedules, and consumers are reported to be indifference to their future needs. Bars, plates and shapes are quotable at 1.65c., Pittsburgh, although this figure is still being shaded on plates and shapes when desirable tonnages are involved.

## COLD-FINISHED STEEL BARS

Producers have not opened their books for third quarter, and new orders are light. Releases have been

somewhat lighter in the first week of June than they were in the corresponding May period. The price is unchanged at 2.10c., Pittsburgh.

## BOLTS, NUTS AND RIVETS

Demand has been tapering off in the last few weeks, and operations in the Pittsburgh district range from 30 to 35 per cent of capacity. Prices have been subject to some uncertainty, largely because of weakness in outside districts. In this territory mills generally are adhering to discounts of 73 per cent off list on bolts and nuts and 70, 10 and 5 per cent on small rivets. Large rivets are quoted at \$2.75 a 100 lb., Pittsburgh.

## TUBULAR GOODS

From the standpoint of large line pipe business, the market has been rather quiet in the last week, although producers report a fair volume of small orders for seamless and electric weld pipe, which are badly needed to balance mill schedules. Lapweld pipe continues very dull. Butt weld material is holding up to recent levels. Demand for oil country goods is un-

changed, and mechanical tubing is somewhat less active, reflecting lighter demand from the automobile industry.

## WIRE PRODUCTS

Little activity is reported either in the market for merchant wire products or manufacturers' wire. On the latter, orders are confined to very small lots, reflecting the low inventories of manufacturing consumers. Jobbers are only taking out sufficient material to maintain minimum stocks and agricultural buyers are apparently awaiting definite crop reports before making commitments. Road mesh is still moving in good volume. Prices on manufacturers' wire continue at 2.20c., Pittsburgh, while nails continue at \$1.80 a keg. Makers have not begun to solicit third quarter contracts.

## SHEETS

With the exception of a slight decline in releases from the automobile industry, demand for sheets has shown no change in the last week. Prices are very weak, and many mills

## THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron	Steel Scrap			
June 9, 1931	2.102c. a Lb.	\$15.63 a Gross Ton	\$9.50 a Gross Ton			
One week ago	2.102c.	15.63	9.67			
One month ago	2.114c.	15.79	9.83			
One year ago	2.214c.	17.50	13.42			
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.				
Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.						
<div>HighLow</div>		<div>HighLow</div>				
1931.....	2.142c., Jan. 13:	2.102c., June 2	\$15.90, Jan. 6:	\$15.63, May 26	\$11.33, Jan. 6:	\$9.50, June 9
1930.....	2.362c., Jan. 7:	2.121c., Dec. 9	18.21, Jan. 7:	15.90, Dec. 16	15.00, Feb. 18:	11.25, Dec. 9
1929.....	2.412c., April 2:	2.362c., Oct. 29	18.71, May 14:	18.21, Dec. 17	17.58, Jan. 29:	14.08, Dec. 3
1928.....	2.391c., Dec. 11:	2.314c., Jan. 3	18.59, Nov. 27:	17.04, July 24	16.50, Dec. 31:	13.08, July 2
1927.....	2.453c., Jan. 4:	2.293c., Oct. 25	19.71, Jan. 4:	17.54, Nov. 1	15.25, Jan. 11:	13.08, Nov. 22
1926.....	2.453c., Jan. 5:	2.403c., May 18	21.54, Jan. 5:	19.46, July 13	17.25, Jan. 5:	14.00, June 1
1925.....	2.560c., Jan. 6:	2.396c., Aug. 18	22.50, Jan. 13:	18.96, July 7	20.83, Jan. 13:	15.08, May 5

are trying to avoid solicitation or orders in an effort to maintain present quotations. The more important consumers are covered by contracts and are ordering material out sparingly. Galvanized sheets are quotable at 2.75c. to 2.80c., Pittsburgh, with most mills openly meeting the lower figure. Black sheets are holding at 2.15c. to 2.25c. and light plates and blue annealed sheets seem to be somewhat firmer at 1.85c. and 2c. respectively. Producers hope to clear old contracts from their books within the next month in order to open the way for complete introduction of the new price schedules.

### TIN PLATE

Production has been well maintained in the last week, with the industry running at 65 to 70 per cent of capacity. One or two large independent companies are maintaining capacity operations, and current specifications would indicate that the present rate of output may be continued through June. Crop reports at that time will determine the future course of activity. The present quotation of \$5 a base box, Pittsburgh, will be continued into the second half; no formal price announcement is likely.

### STRIP STEEL

Strip makers have been affected more than other finished steel producers by declining requirements of the automobile industry, and demand from miscellaneous consumers is very light. Operations are difficult to estimate because of interrupted mill schedules, but do not average more than 35 per cent on hot-rolled material and 25 per cent on cold-rolled. Makers are generally trying to get 1.55c. and 1.65c., Pittsburgh, on hot-rolled strip on third quarter business, although orders for immediate shipment can still be booked for \$1 a ton less. The cold-rolled market is badly influenced by price cutting in certain districts. Leading producers are quoting 2.15c., Pittsburgh, but consumers report lower figures on comparatively small orders.

### COKE AND COAL

This market has not been affected by labor troubles in the mining districts, and is as dull as it has been. Furnace coke is quotable at \$2.40, Connellsville, and the market on ordinary foundry coke ranges from \$3.25 to \$3.50. The volume of shipments does not vary from week to week.

### OLD MATERIAL

One of the large consumers of the district has purchased tonnages of No. 1 heavy melting steel from at least two dealers at \$10.50, and is expected to do further buying before the end of the week. As no purchases by this company have been made for several months, the transaction is regarded with more than usual interest. Deal-

ers are inclined to believe that this indicates a feeling on the part of consumers that the bottom of the market has been reached. The two principal railroad lists offered in this district were heavily bought by dealers at prices ranging from \$10 to \$10.25, Pittsburgh district consuming points, and a tonnage went to the Valleys at \$10. These transactions clearly establish the market on this grade at \$10 to \$10.50, a decline of 50c. in the last week. However, sentiment in the scrap trade is considerably improved. Dealers showed belief that the protracted decline in prices was being checked by their willingness to build up yard stocks from the railroad lists. No other changes in scrap quotations are reported, except in the case of specialties, which are off 50c. a ton. The blast furnace grades are holding at around the \$7 level, and hydraulic compressed sheets, although weak at \$10 to \$10.50, are not quotably lower.

### Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.	
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.35c.
Squares and flats.....	3.85c.
Bands.....	2.95c.
Hoops.....	3.95c.
Black sheets (No. 24), 25 or more bundles.....	3.05c.
Galv. sheets (No. 24), 25 or more bundles.....	3.40c.
Light plates, blue annealed (No. 10).....	2.75c. to 3.00c.
Blue annealed sheets (No. 13).....	2.90c. to 3.00c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.74c.
Spikes, large.....	2.65c.
Small.....	2.90c. to 3.05c.
Boat.....	3.15c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.....	\$3.20
Wire, black, soft ann'd, base per 100 lb.....	2.30
Wire, galv, soft, base per 100 lb.....	2.75
Common wire nails, per keg.....	2.05
Cement coated nails, per keg.....	2.05

\*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.00 to \$10.50
No. 2 heavy melting steel.....	9.25 to 9.75
Scrap rails.....	10.00 to 10.50
Compressed sheet steel.....	10.00 to 10.50
Bundled sheets, sides and ends.....	8.00 to 8.50
Cast iron carwheels.....	11.00 to 11.50
Sheet bar crops, ordinary.....	11.00 to 11.50
Heavy breakable cast.....	8.00 to 8.50
No. 2 railroad wrought.....	10.00 to 10.50
Hvy. steel axle turnings.....	9.00 to 9.50
Machine shop turnings.....	6.50 to 7.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers.....	12.50 to 13.00
Railr. coil and leaf springs.....	12.50 to 13.00
Rolled steel wheels.....	12.50 to 13.00
Low phos. billet and bloom ends.....	14.00 to 14.50
Low phos. mill plates.....	12.00 to 12.50
Low phos. light grades.....	12.00 to 12.50
Low phos. sheet bar crops.....	13.00 to 13.50
Heavy steel axle turnings.....	9.00 to 9.50
Electric Furnace Grades:	
Low phos. punchings.....	13.50 to 14.00
Heavy steel axle turnings.....	9.00 to 9.50
Blast Furnace Grades:	
Short shoveling steel turnings.....	6.75 to 7.25
Short mixed borings and turnings.....	6.75 to 7.25
Cast iron borings.....	6.75 to 7.25
Rolling Mill Grades:	
Steel car axles.....	16.50 to 17.50
Cupola Grades:	
No. 1 cast.....	10.00 to 10.50
Rails 3 ft. and under.....	12.50 to 13.00



# CHICAGO

## Operations Give Ground Slowly— Blast Furnace Goes Out

**C**HICAGO, June 9.—Ingot output continues to give ground slowly, average production in this district now being about 41 per cent of capacity.

Illinois Steel has blown out "E" furnace at South Works. Twelve of 36 steel mill blast furnaces are now in use in this district. Demand for sheets is running somewhat lighter than at the turn of the month, and smaller tonnages of steel are being taken by a number of the automobile manufacturers. Rail schedules are increasingly difficult to maintain, though producers are pressing hard for releases against orders still on their books. The wire market seems to be taking a middle course, with orders and shipments about equal to the rate in June last year. New releases of skelp for pipe manufacture are lending assurance that plate rolling schedules will vary little in coming weeks. Bridge work is also contributing in larger measure to this market. The structural market appears to have more than held the gains registered in recent weeks.

From information available here, it appears that the 25,000 tons of steel needed for the Marshall Field Estate Building, Chicago, will move from Buffalo to Chicago by boat during the remainder of the summer and the fall navigation season. The bulk of fabrication will be in local shops.

The growing interest in distant steel markets is well illustrated by the arrival this week of a cargo of steel from Cleveland. Since the opening of the Lake shipping season steel has been moving from Chicago to various points of consumption along the shores of the Great Lakes.

Little information is available as to final action that will be taken on prices for the third quarter. There seems to be a disposition to slide quietly toward the opening of the new quarter without putting anything in the way of consumer interest that may develop.

### FERROALLOYS

Specifications are a trifle heavier, but this is looked upon as a variation which may readily occur from week to week. Several scattered orders have been placed for small lots of spiegeleisen. Both inquiries and sales are very light.

### PIG IRON

Inquiries for third quarter Northern foundry iron are now making their appearance, and some iron for that delivery has been purchased. The movement, however, has not gone far

**Ingot output declines slowly, being estimated at 41 per cent for district this week.**

\* \* \*

**Blast furnace goes out, leaving 12 of 36 steel mill stacks in service.**

\* \* \*

**Decline in pig iron shipments may be halted as shipping orders increase.**

\* \* \*

**Demand for some lines of finished steel continues to recede slowly.**

\* \* \*

**Scrap trade believes next price move will be upward, though change may not develop for month or two.**

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and its true measure cannot be taken for 10 days to two weeks. There appears good reason to believe that the drop in shipments has been halted, shipping instructions being a shade heavier. A few carloads of Southern iron have been placed at \$11 a ton, Birmingham. Charcoal iron is moving slowly in the range from \$22 to \$24 a ton, furnace.

*Prices per gross ton at Chicago:*

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	\$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, cop-per free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

### CAST IRON PIPE

This market remains comparatively quiet, a condition contrary to that expected by the trade for June. Sellers had taken a survey earlier in the year of the number and size of plans on engineers' boards and, with this as a basis, had anticipated rather an active summer. Though few of the plans have been shelved, the vast majority of them are slow in coming out for figures. James B. Clow & Sons have been awarded 750 tons of 30 and 36-in. pipe by Racine, Wis., and 16,000 ft. of 6 to 12-in. pipe by Appleton, Wis. Chicago has divided 3500 tons of 6 to 12-in. pipe among three bidders. Alabama Pipe Co. is low bidder at Fox Point, Wis., on 1150 tons of 4 to 12-in. Class C pipe. The quotations were \$34.50 a ton, Birmingham,

for the 4-in. and \$31.50 for the 6, 8 and 12-in. Tippecanoe City, Ohio, is in the market for 16,000 ft. of 4 to 8-in. pipe, and Akron, Ohio, will buy 200 tons of 24-in.

*Prices per net ton, deliv'd Chicago:* Water pipe, 6-in. and over, \$42 to \$44; 4-in., \$45 to \$47; Class A and gas pipe, \$3 extra.

### SHEETS

Production is somewhat lighter, the average now being not above 40 per cent of capacity. Individual orders are small and inquiries give no indication that buyers are thinking in terms of third quarter requirements. Price policies for the coming quarter are still undetermined. Although most industries are lagging behind what is normally expected of them at this time of year, the container manufacturers continue to hold to fair production schedules.

*Base prices per lb., deliv'd from mill in Chicago:* No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 2.95c. to 3.05c.; No. 10 blue ann'd., 2.00c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

### BOLTS, NUTS AND RIVETS

Specifications continue to fall off. Most producers are carrying full stocks and output is being curtailed as demand drops. Production is not above 35 per cent of capacity. Sellers are finding little resistance to quotations in third quarter contracts now being put before the trade.

### PLATES

The plate market is somewhat more cheerful. The Northern Pacific has given the word for work to start on its last two orders for underframes and superstructure sets, with the result that 8000 tons of car material has been placed with two Chicago mills. The pipe manufacturer at Milwaukee is scheduling more skelp shipments at mills. It is understood that this does not necessarily mean a movement of larger tonnages, but rather that present rolling programs will be maintained through most of June. Recent awards of large diameter pipe have been in encouraging volume, and there are some in the trade who believe that live projects will assure a more or less steady production program through most of the summer. There is under consideration at Fort Wayne, Ind., a project that may make use of 3000 tons of steel pipe. Recent developments in the tank market are of little moment. The argument over proration in the Southwest is still in full swing, and there is only an occasional order for a large tank. On the other hand, the run of orders for small oil storage tanks, such as are used at

filling stations, is heavier than it has been at any time in the spring months, and interest appears to be growing. Plate orders for railroad shops are far below seasonal expectations, notwithstanding that tonnages being sought are now larger than in May.

## STRUCTURAL MATERIAL

There has been another active week in structural awards, the total being well up toward 9000 tons. It is now known that the Marshall Field Estate Building, Chicago, will require 25,000 tons of shapes rather than 16,000 tons, as reported last week. This project, which will be put under way early in 1932, will have columns of silicon steel for the first 24 floors. The floors will be of tile construction, thereby eliminating a round tonnage of reinforcing bars. Noteworthy among active projects is 20,000 tons for a bridge for the Louisville & Nashville, 6000 to 8000 tons for a viaduct at Milwaukee, 2000 tons for the Western Electric Co., Chicago, and 3000 tons for a municipal building at St. Paul. A program to bring about standardization in the sections of H beams is putting pressure on architects to place orders on designs based on old sections which will not be rolled after July 1. Carnegie, Bethlehem and Illinois have revised their respective sections to facilitate interchangeability, to reduce the number of sections as well as to eliminate certain overlapping groups. The new Bethlehem H column will hereafter be rolled with a slope on the inside of the flanges.

## BARS

Demand for bars remains steady except at those mills that have had lighter specifications from automobile manufacturers. The miscellaneous use of mild steel bars is holding closely to the May rate, and current specifications indicate little change in the immediate future. Consumer interest is dull in so far as iron bars are concerned. Shipments of alloy steel bars are turning down slightly. New business in rail steel bars is off rather sharply, but production is unaltered for the reason that mills in this district had built fair backlogs, considering the business situation as a whole.

## WIRE PRODUCTS

Use of wire and wire products has leveled off to a rate that approximates 35 per cent of mill capacity, which is comparable to demand in June last year. Distribution by the jobbing trade is slow, with little prospect that a revival will occur before the end of the summer. Manufacturers of lawn fencing are keenly disappointed in the light flow of orders at this time, which is usually one of their busy seasons. In general, crop reports are favorable, with the forecast that the wheat yield will be large. Some trouble is being experienced because of dry weather in the Northwest and in western Canada.

## RAILS AND TRACK SUPPLIES

The Western rail market is dull even to the point that producers are putting pressure on railroads for releases against old commitments. The Tennessee company will roll 6000 tons for the Seaboard Air Line, and the Pacific Coast Steel Corp. will furnish 3000 tons of tie plates and 500 tons of spikes to the Great Northern. Orders for track supplies in the Chicago district are small and scattered. Specifications are holding to the average of recent weeks.

## REINFORCING BARS

Inquiries and new business in reinforcing bars used for building purposes are undergoing a seasonal decline, but the slack is being taken up by demand for bars to be used in pavements and bridges. Although there is still tonnage to be placed for highway work, the general opinion among dealers is that before the end of this month, bending operations will have definitely turned downward. Scattered inquiries are giving estimating departments a fair amount of work, but there seems to be little relation between the number of requests for prices and the number of orders placed. Floor construction of the Marshall Field Estate Building, Chicago, will be of flat tile, thereby eliminating a large tonnage of reinforcing bars.

## COKE

This market continues to drag along as it has in recent weeks. Shipments have gradually been growing lighter in conformity with the lessened melt of pig iron. Quotations at ovens are steady at \$7.50 a ton.

## OLD MATERIAL

A small tonnage of heavy melting steel has been taken by a steel mill at \$9 a ton, delivered. This move is rather significant from the viewpoint

that blast furnace production is being reduced, larger quantities of scrap are being used by mills and dealers are hesitant to take a short position in the market. Scrap is not coming out in sufficient volume to give dealers ease of mind so that they can feel free to take large orders. They take the stand that a price advance is needed to start an inflow from a wider territory than is now supplying Chicago mills. While a week ago some dealers believed that prices had become stable, they are now beginning to look forward to higher prices. In this they are getting support from some of the railroads that are dissatisfied with the practice of accepting the highest bid, which in this market is low at best. Accordingly, the railroads are putting their offerings on a merchandising basis; that is the railroad sets the price at which it will sell with the reservation that, if its offers are not accepted, the scrap will be withheld from the market. There still exists a scarcity of cast iron carwheels, and somewhat of a scramble for axles and several of the cast grades is developing.

Prices deliv'd Chicago district consumers:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel	\$8.50 to \$9.00
Shoveling steel	8.50 to 9.00
Frogs, switches and guards, cut apart, and misc. rails	8.50 to 9.00
Factory hyd. comp. sheets	7.00 to 7.50
Drop forge flashings	6.00 to 6.50
No. 1 busheling	6.75 to 7.25
Forge'd cast and r'd steel carwheels	11.00 to 11.50
Railroad tires, charge, box size	11.50 to 12.00
Railroad leaf springs cut apart	11.00 to 11.50
Axle turnings	7.00 to 7.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	9.75 to 10.25
Coil springs	11.50 to 12.00
Electric Furnace Grades:	
Axle turnings	7.50 to 8.00
Low phos. punchings	10.75 to 11.25
Low phos. plates, 12 in. and under	10.50 to 11.00
Blast Furnace Grades:	
Cast iron borings	3.75 to 4.00
Short shoveling turnings	3.50 to 4.00
Machine shop turnings	3.50 to 4.00
Rolling Mill Grades:	
Rerolling rails	10.50 to 11.00
Cupola Grades:	
Steel rails, less than 3 ft.	10.50 to 11.00
Steel rails, less than 2 ft.	11.50 to 12.00
Angle bars, steel	10.00 to 10.50
Cast iron carwheels	10.00 to 10.50
Malleable Grades:	
Railroad	9.50 to 10.00
Agricultural	9.00 to 9.25
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relaying rails, 65 lb. and heavier	22.00 to 27.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	9.00 to 9.50
Iron arch bars and transoms	10.50 to 11.00
Iron car axles	17.50 to 18.50
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	7.50 to 8.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 busheling	6.00 to 6.50
No. 2 busheling	4.00 to 4.50
Locomotive tires, smooth	11.50 to 12.50
Pipes and flues	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	7.00 to 7.50
Stove plate	6.25 to 6.75
Grate bars	6.00 to 6.50
Brake shoes	6.00 to 6.50

\*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

## Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes	3.00c.
Soft steel bars	2.90c.
Reinforcing bars, billet steel	1.65c. to 2.00c.
Rail steel reinforcement—	
For buildings	1.45c. to 1.65c.
Highway slabs	1.65c.
For bridges and culverts	1.75c.
Cold-fin, steel bars and shafting—	
Rounds and hexagons	3.35c.
Flats and squares	3.85c.
Bands, 3/4 in. (in Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)	3.65c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Blue ann'd sheets (No. 10)	3.35c.
Spikes (3/4 in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
Per Cent Off List	
Machine bolts	60 and 10
Carriage bolts	60 and 10
Cow and lag screws	60 and 10
Hot-pressed nuts, sq., tap, or blank	60 and 10
Hot-pressed nuts, hex., tap, or blank	60 and 10
No. 8 black ann'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	2.30
Cement c'd nails, base per keg	2.30



# CLEVELAND Tapering Automobile Schedules Noticeably Reflected in Steel Orders

CLEVELAND, June 9.—Business in finished steel from the motor car industry is tapering off, and this is noticeably reflected in the order books of mills that serve that industry. Demand from other sources continues very light. One local plant shut down two open-hearth furnaces this week and another took off one furnace, reducing local operations to 15 furnaces out of 34, or 44 per cent of capacity, which is the lowest for this year. Finishing mills have further curtailed their schedules.

There is considerable uncertainty about the steel requirements of the motor car industry for the next few weeks. Very little business has come from that source the past week, and motor car manufacturers evidently have not decided on their July production schedules, as none of the leading car builders has come into the market for steel for its late June or July requirements. Orders for steel from other consuming industries are confined to small lots and are for quick shipment.

There is a general feeling that the demand is dragging bottom, so that the next change will be for the better, although there is little expectation of an improvement before fall.

Very little interest is being shown in third quarter contracts and prices. No inquiry for that delivery has come out except from a few of the automobile companies for sheets, and they show no hurry in placing contracts. Indications are that current prices on bars, plates and shapes will be continued through the third quarter. A severe market test is expected over the new 2.40c. price on hot-rolled annealed sheets under the new classification plan. Makers of hot-rolled strip seem determined to hold to the announced \$1 a ton price advance. Present prices on bolts, nuts and rivets have been reaffirmed for the coming quarter.

## PIG IRON

The market continues very dull, with sales for the most part limited to small lots for immediate needs. A Lima, Ohio, foundry has purchased 500 tons from a Lake furnace and another Ohio consumer is inquiring for 500 tons of various grades. Shipping orders have declined from those of May, this being particularly true of orders from foundries making motor car castings. Operations of jobbing foundries in northern Ohio show a downward tendency. Prices appear well maintained at \$16 to \$17, Lake furnace, for Ohio and Indiana shipment, and \$17 to \$17.50 for Michigan.

For Cleveland delivery, \$17, furnace, is the ruling price.

## Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.....	\$17.00
S'th'n fdy., sil. 1.75 to 2.25.....	17.01
Malleable .....	17.50
Ohio silvery, 8 per cent.....	25.00
Stand. low phos., Valley.....	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

## IRON ORE

Dock shipments reflect the slow ore movement from the mines. Shipments from Lake Erie docks during May were 769,436 tons, against 3,303,766 tons in May last year. Receipts at these docks in May were 598,843 tons and for the season 608,253 tons, against 3,987,258 tons during the corresponding period last year. Shipments for the season until June 1 were 1,124,885 tons, against 4,074,228 tons up to June 1 last year. The dock balance June 1 was 5,147,102 tons, against 4,252,790 tons on the same date a year ago.

## BARS, PLATES AND SHAPES

Steel bars are very dull. Reinforcing bars are in fair demand for bridge work, but are moving very slowly for building work. Mills are getting a moderate volume of structural material for jobs recently placed. There is little new inquiry in the building field. Bids for the Cleveland Juvenile Court Building, requiring 700 tons, will be taken July 2. Prices on fabricated work are weak. Plate orders are confined to small lots. A gas holder in Philadelphia will require 2000 tons. Steel bars are quoted at 1.70c., Cleveland, for local delivery and at 1.65c. for outside shipment. Reinforcing bars of new billet steel are at 1.60c., Cleveland. Plates and shapes are steady at 1.65c., Pittsburgh.

## BOLTS, NUTS AND RIVETS

Reaffirmation of present prices for the third quarter is announced by

## Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinforce. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.40c.
Cold-fin. flats and sq.....	3.90c.
Hoops and bands, No. 12 to 4 in. inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Black sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.00c.
Blue ann'd sheets (No. 10).....	3.00c.
No. 9 ann'd wire, per 100 lb.....	\$2.35
No. 9 galv. wire, per 100 lb.....	2.80
Com. wire nails, base per keg.....	2.25

\*Net base, including boxing and cutting to length.

bolt, nut and rivet manufacturers. The unchanged quotations are 73 per cent discount from list for bolts and nuts, \$2.75 per 100 lb. for large rivets and 70, 10 and 5 per cent for small rivets. Rivet makers will extend second quarter contracts through the coming quarter with many of their customers rather than make new contracts. Demand for these products is very slow from all classes of consumers as well as from jobbers. Plant operations are about 35 per cent of capacity.

## STRIP STEEL

Some of the leading makers of automobile accessories are inquiring for hot-rolled strip for their July requirements, but in quantities about one-third less than they purchased for June. While the demand is declining, specifications with some of the mills are still fair. Producers are apparently taking a firm stand on the \$1 a ton price advance to 1.55c. and 1.65c., Pittsburgh, for hot-rolled strip for the third quarter and, while the advance has not been tested, if it holds it is expected to drive in considerable tonnage against expiring contracts. Cold-rolled strip is inactive. This ranges from 2.15c. to 2.25c., Cleveland, the higher price only for very small lots, and it is expected that the larger buyers will be given the lower price for the third quarter.

## SHEETS

With very little business coming from the motor car industry, the market was very dull the past week. Recent inquiries from some of the motor car manufacturers for the third quarter have not yet resulted in any contracts for that delivery. One leading producer during the week announced its adoption of the new sheet classification. A few small-lot sales have been made of full pickled, cold-rolled sheets that are reduced under the new schedules, but no business is reported on grades and gages that will be advanced. Consequently the new prices have not been tested. A fair volume of business is coming from some of the stove manufacturers and from the refrigerator industry, although the latter is not maintaining its early spring production. Mills will accept orders under the old classification through June, but announce that contracts not specified against before July 1 will be canceled. Old prices are being generally maintained on current orders. Black sheets are quoted at 2.15c., Pittsburgh, on most business.

## OLD MATERIAL

A Cleveland mill has purchased a small tonnage of compressed sheet (Concluded on page 1953)



# NEW YORK

## Coal Miners' Strike Stiffens Coke Quotations—Sheet Prices Still Weak

**N**EW YORK, June 9.—Pig iron demand shows little variation from week to week. The largest sale reported was 1500 tons for delivery to a plant in the Baltimore district. Transactions in this immediate territory were individually small, totaling 3000 tons, compared with 3500 tons in the previous week. A nearby New Jersey melter is feeling out the market for a sizable tonnage, but formal inquiries are few and far between. Foundries are still exceedingly conservative in buying, frequently underestimating their requirements and asking for rush shipments. Nevertheless, sentiment has been totally improved by the recent upturn in the stock market.

Southern iron is less of a factor than formerly. At \$11, Birmingham, it has an advantage on a delivered basis at relatively few points. Eastern Pennsylvania iron continues to be quoted at \$16 to \$17, furnace. For all-rail delivery, Buffalo iron figures out rather high on a price basis in certain sections, but barge iron is still available from stock or from direct water shipments. The northern New York and New England producers are also shipping extensively by water routes.

The American Locomotive Co. is inquiring for 150 tons of No. IX for its Schenectady, N. Y., plant.

*Prices per gross ton, delivered New York district:*

Buffalo No. 2 fdy., sil. 1.75	
to 2.25	\$19.91 to \$20.41
*Buff. No. 2, del'd east.	
N. J.	18.28 to 18.78
East. Pa. No. 2 fdy., sil.	
1.75 to 2.25	17.39 to 17.89
East. Pa. No. 2X fdy., sil.	
2.25 to 2.75	17.89 to 18.39

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.  
\*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

### FINISHED STEEL

With the demand for steel showing nothing of a promising character, attention is being centered on the price situation for the third quarter. Makers of sheets and strip will try to put their house in order by an insistence that all tonnage on second quarter contracts be specified not later than June 30 for shipment before the last day of July. As this means that many consumers will have enough steel on order to carry them well into August, the question of third quarter contracts is not of paramount importance. Sheet makers apparently are determined to carry their new classification into full effect as soon as feasible, though it is possible that some modifications will occur on the grades that have been sharply advanced. Meanwhile, the current price situation on sheets and strips is not conducive to the stabilization program enunciated at the spring meeting of the

American Iron and Steel Institute. Wide hot-rolled strips have been sold at less than 1.50c., Pittsburgh, cold-rolled strip steel has been offered at \$1 and \$2 concessions from 2.15c., Pittsburgh or Cleveland, and galvanized sheets are being freely sold at 2.75c., Pittsburgh, with occasional concessions to 2.70c., particularly to jobbers. Although 2.25c. is the minimum price of some mills on black sheets, others will still accept orders for early delivery at 2.15c. Prices of plates, shapes and bars reflect greater stability than the light flat rolled products, but there are occasional concessions from 1.65c., Pittsburgh, on plates and shapes. Makers of tin plate are soliciting second half contracts on the basis of the published price of \$5 a base box, Pittsburgh.

### CAST IRON PIPE

The volume of new inquiry, which had reached sizable proportions recently, has declined, and new business is mostly in lots of a carload or smaller. Prices continue irregular, with Northern foundries seeking to maintain a range of \$32 to \$34 a ton, f.o.b. foundry, but concessions of \$1 and \$2 a ton are occasionally granted on substantial contracts.

*Prices per net ton deliv'd New York:*  
Water pipe, 6-in. and larger, \$33.90 to \$35.90; 4-in. and 5-in., \$36.90 to \$38.90; 3-in., \$43.90 to \$45.90. Class A and gas pipe, \$3 extra.

### REINFORCING BARS

Billet steel bars are quoted at 1.60c. to 1.65c., Pittsburgh, or 1.93c. to 1.98c., New York, with only occasional

### Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'd sheets (No. 10)	3.00c. to 3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long term sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ¼ in. and larger	3.40c.
Smooth finish, 1 to 2 ½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

\*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
1 x 30 in. and smaller	.65 to .65 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
¾ x 20 in. and smaller	.65 to .65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

concessions from 1.60c., Pittsburgh, on sizable projects. One of the large reinforced concrete projects in the market is a sewer in Queens, which will require about 600 tons of bars instead of 200 tons, as previously reported. Two sewer construction projects on the New York Central Railroad on the West Side of Manhattan Island call for about 500 tons of bars.

### COKE

A coal strike, which has broken out in western Pennsylvania and West Virginia, looms up as a market factor of unpredictable importance. A similar strike in April, 1922, coincided with the turning point in our last severe depression, driving furnace coke from \$3.25 to \$7.50, Connellsville, before the end of the half-year. Although the present strike has not yet reached serious proportions, Connellsville coke oven operators have already taken a firmer position on prices. Foundry coke contracting for the last half of 1931 has largely been completed. Foundry coke quotations follow:

Special brands of beehive foundry coke, \$4 to \$4.85 a net ton, ovens, or \$7.71 to \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$8.59 to \$9.43 to New York and Brooklyn; by-product foundry coke, \$8.70 to \$9.10, Newark or Jersey City; \$9.76, New York or Brooklyn.

### OLD MATERIAL

Transactions are confined to sales of small distress lots of material, and barge movement of No. 1 and No. 2 heavy melting steel to Buffalo. At present eastern Pennsylvania consumers of No. 1 steel at Coatesville, Pa., and Claymont, Del., are postponing deliveries. Although supplies of scrap are plentiful, brokers filling contracts report that there is a decreasing volume of various grades being offered as a result of the present price level.

*Dealers' buying prices per gross ton, f.o.b. New York:*

No. 1 heavy melting steel	\$5.00 to \$6.50
Heavy melting steel (yard)	4.00 to 5.00
No. 1 hvy. breakable cast	6.50
Stove plate (steel works)	4.00 to 4.25
Locomotive grate bars	4.00 to 4.25
Machine shop turnings	2.00
Short shoveling turnings	2.00
Cast borings (blast fur. or steel works)	2.25
Mixed borings and turnings	1.75 to 2.00
Steel car axles	12.50 to 13.00
Iron car axles	16.50 to 17.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	6.25
Forge fire	5.00 to 5.50
No. 1 railroad wrought	8.25
No. 1 yard wrought, long	7.25
Rails for rolling	6.50 to 7.00
Stove plate (foundry)	4.50
Malleable cast (railroad)	7.50 to 8.00
Cast borings (chemical)	8.00 to 8.50

*Prices per gross ton, deliv'd local foundries:*

No. 1 machry. cast	\$12.00 to \$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)	10.00 to 10.50
No. 2 cast (radiators, cast boilers, etc.)	9.50 to 10.00

# PHILADELPHIA

## Steel Operations Unchanged— Scrap Sales at Low Levels

**P**HILADELPHIA, June 9.—Steel buying is generally limited to small lots, with consumers reducing reserve supplies to a minimum. Local radio manufacturers are small buyers of electrical and other grades of sheets, two of the three leading makers producing about 2000 sets a day each. Some metal-working plants are moderately well engaged, but users of the heavy steel products continue on small production schedules. Operating rates of steel mills in this district average slightly above 35 per cent of capacity, with the leading independent interest at 41 to 42 per cent.

The Pennsylvania Railroad has not yet inquired for 150 locomotives, the electrical equipment for which has been placed. Meanwhile prices are being taken on electrical equipment for 80 more locomotives.

### PIG IRON

Consumers are limiting their purchases to carload lots, on which \$16.50 a ton, furnace, is generally quoted by eastern Pennsylvania sellers. When a larger order is offered, concessions to \$16.25 a ton, base, are not uncommon. Southern foundry iron is quoted at \$11 a ton, Birmingham, or \$16.25 a ton, on dock, Philadelphia, which leaves only a narrow margin between the eastern Pennsylvania and Southern delivered price. Arrivals of Soviet iron ore at Baltimore have been substantial this year, in the first four months exceeding total imports for all of 1930. May arrivals alone are reported at 33,100 gross tons, made up of five cargoes.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.25
East. Pa. No. 2X, 2.25 to 2.75 sil.	17.75
East. Pa. No. 1X, 1.75 to 2.25 sil.	18.25
Basic (del'd east. Pa.)	\$17.00 to 17.25
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'rg low phos. f.o.b. furnace	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.25
Va. No. 2X, 2.25 to 2.75 sil.	22.75

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

### STEEL BARS

Quotations are unchanged at 1.60c. to 1.65c., Pittsburgh, or 1.89c. to 1.94c., Philadelphia, with buying limited to occasional lots of less than a carload. Billet steel reinforcing bars are 1.60c. to 1.65c., Pittsburgh, or 1.89c. to 1.94c., Philadelphia, and concessions of \$1 a ton or more are generally granted on substantial orders. Rail steel bars continue at 1.20c. to 1.30c., Pittsburgh, or 1.49c. to 1.54c., Philadelphia. Bids have been taken

on a standpipe foundation at Lancaster, Pa., requiring 115 tons of reinforcing bars.

### SHAPES

Mills are operating at 35 to 40 per cent of capacity, executing small orders. On ordinary specifications, the quotation is 1.70c. to 1.75c., f.o.b., nearest mill to consumer, or 1.76c. to 1.81c., delivered Philadelphia, with occasional concessions to 1.65c., mill, or 1.71c., Philadelphia, on more desirable orders. Fabricating shops are in need of tonnage, most current projects being small in size. A library for Girard College, requiring 850 tons, has been awarded to a local fabricator.

### PLATES

Small storage tanks to be erected at Point Breeze and Marcus Hook, Pa., have not yet been awarded to fabricators. Current plate business is in small lots, but prices are unchanged at 1.75c., f.o.b. Coatesville, or 1.85½c., Philadelphia, with concessions of \$1 a ton to 1.70c., Coatesville, or 1.80½c., Philadelphia, on desirable business.

### SHEETS

Radio manufacturers have been increasing the size of their purchases recently, but are still using only small tonnages. Two of the leading radio makers, now operating at 2000 small sets a day, expect to begin their season of production by the end of July, or earlier. Sheet prices are unchanged, with black sheets quoted at 2.25c., Pittsburgh, or 2.54c., Philadelphia, and a substantial volume of present business being placed at 2.20c., Pittsburgh, or 2.49c., Philadelphia. Galvanized sheets range from 2.75c. to 2.80c., Pittsburgh, or 3.04c. to 3.09c., Philadelphia, with concessions to 2.70c., Pittsburgh, occasion-

ally granted to the larger distributors. Blue annealed sheets are 2c., Pittsburgh, or 2.29c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.85c., Pittsburgh, or 2.14c., Philadelphia.

### IMPORTS

In the week ended June 6, 2094 tons of pig iron arrived at this port from British India. Ore arrivals consisted of 6670 tons of iron ore from Algeria and 5187 tons of chrome ore, of which 3135 tons was from Cuba, 2000 tons from Portugal and 52 tons from South Africa. Steel imports were 14 tons of steel bars and one ton of bearing bars from Sweden.

### OLD MATERIAL

Iron and steel scrap quotations are virtually nominal, as most of the current transactions are distress sales of one or two carloads of material. As examples of sales, the prices on which cannot be considered as determining the actual market at which a consumer could buy freely rolled steel wheels were recently sold by a railroad at \$9.75 a ton, delivered, and there have been other transactions in distress carloads of this material at \$11 and \$11.50 a ton. No. 1 low phosphorus steel has been sold at as little as \$10 a ton, delivered, for a distress carload. The consumer at Bethlehem, Pa., has been able to buy scattered carloads of No. 1 heavy melting steel at \$8 and \$8.50 a ton, delivered, but it is considered doubtful that any dealer would be willing to sell a substantial tonnage of No. 1 steel at these prices.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$9.00 to \$10.00
No. 2 heavy melting steel	7.00 to 7.50
Heavy melting steel (yard)	6.50 to 7.00
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets (for steel works)	6.50
Hydraulic compressed, new	7.50 to 8.50
Hydraulic compressed, old	6.50 to 7.00
Machine shop turnings (for steel works)	5.00 to 6.00
Heavy axle turnings (or equiv.)	8.00 to 8.50
Cast borings (for steel works and roll. mill)	5.00 to 6.00
Heavy breakable cast (for steel works)	10.50
Railroad grate bars	8.00
Stove plate (for steel works)	8.00
No. 1 low phos. hvy. (0.04% and under)	13.00 to 14.00
Couplers and knuckles	12.00 to 12.50
Roller steel wheels	11.00 to 11.50
No. 1 blast f'nace (nom.)	4.50
Wrot. iron and soft steel pipes and tubes (new specific)	11.00 to 11.50
Shafting	16.50 to 17.00
Steel axles	16.50 to 17.00
No. 1 forge fire	8.50 to 9.00
Cast iron carwheels	12.00 to 12.50
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	12.00 to 12.50
Steel rails for rolling	12.00 to 13.00

### Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¼-in. incl.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.40c.
†Galvanized sheets (No. 24)	3.85c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'd sheets (No. 13)	3.20c.
Diarn. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

\*For 50 bundles or more; 10 to 49 bun., 3.65c. base; 1 to 9 bun., 3.90c. base.  
†For 50 bundles or more; 10 to 49 bun., 4.20c. base; 1 to 9 bun., 4.55c. base.

## BOSTON Connecticut Melter Buys 1000 Tons of Malleable Pig Iron

BOSTON, June 9.—Pig iron sales the past week aggregated 1650 tons, of which the Mystic Iron Works took 1350 tons. Included in the Mystic sales was 1000 tons of malleable iron for a Connecticut consumer. There is no open inquiry in the market, and foundries are still holding up shipments of contract iron. The New England melt is about 17 per cent of the aggregate foundry capacity, a decline from a month ago.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$19.91 to \$20.91
*Buffalo, sil. 2.25 to 2.75	19.91 to 20.91
*Buffalo, sil. 1.75 to 2.25	19.28 to 20.28
*Buffalo, sil. 2.25 to 2.75	19.28 to 20.28
*Ala., sil. 1.75 to 2.25	20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
*Ala., sil. 1.75 to 2.25	18.75
*Ala., sil. 2.25 to 2.75	17.25

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

\*All rail rate.

†Rail and water rate.

### CAST IRON PIPE

The Donaldson Iron Co. has sold 400 tons of 6, 8, 10 and 12-in. Class B pipe to Madawaski, Me. The Warren Foundry & Pipe Co. was the low bidder on 142 tons of 6 and 8-in. pipe required by Lynn, Mass., but no award has been made. Municipalities are now confining purchases to occasional carlots.

### REINFORCING STEEL

Awards approximated 800 tons the past week, while new projects were not more than 500 tons. On small jobs, local firms are holding billet steel bars at 3c. a lb., base, from stock, on 1 to 5-ton lots, and at 2.40c. on 6 to 99-ton lots. For 100-ton lots and larger, the openly quoted price of 2.30c. a lb., base, is not usually maintained on actual figuring.

### Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36 1/4c.
Structural shapes—	
Angles and beams	3.36 1/4c.
Tees	3.36 1/4c.
Zees	3.36 1/4c.
Soft steel bars, small shapes	3.26 1/4c.
Reinforcing bars	3.11 1/4c. to 3.26 1/4c.
Iron bars—	
Refined	3.26 1/4c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 5.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List.
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

### FINISHED STEEL

A second 60-in. welded steel pipe line from Newton to Watertown, Mass., 8400 ft., has been awarded, this one to Thomas J. McCue, Watertown. William R. Farrell, Boston, will furnish 120 tons of steel piling for a light-house at Woods Hole, Mass. Business in fabricated steel, following a little spurt of two weeks, has quieted down again, contracts for the past week amounting only to 800 tons, while less than 700 tons of new business is being figured.

### COKE

On June 8, the New England Coal & Coke Co. and the Providence Gas Co. opened books for last half foundry coke contracts. As in former years, the contracts are on a sliding scale basis. The current price is \$10.50 a ton, delivered within a \$3.10 freight rate zone.

### OLD MATERIAL

Business is confined almost exclusively to scattered car lots of No. 1 heavy melting steel, T rails, skeleton,

mixed borings and turnings and breakable cast. The American Steel & Wire Co., Worcester, is paying \$6.75 a ton, delivered, for heavy melting steel and T rails, which brings the price f.o.b. cars shipping point down to \$4.85 a ton, and is paying \$5.75 a ton, delivered, for bundled skeleton, equivalent to \$3.85 a ton on cars shipping point. Pennsylvania consumers are taking mixed borings and turnings and breakable cast, and brokers are paying \$1 a ton, on cars shipping point, for the former and \$5 for the breakable cast.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$4.85
Scrap T rails	4.85
Scrap girder rails	4.00 to 4.25
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	1.00 to 1.25
Cast iron borings (steel works and rolling mill)	1.00 to 1.25
Bundled skeleton, long	3.85
Forge flashings	5.00 to 5.25
Blast furnace borings and turnings	1.00
Forge scrap	5.00 to 5.25
Shafting	10.00 to 10.50
Steel car axles	11.00 to 12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.00 to 5.25
Rails for rolling	7.50 to 8.00
Cast iron borings, chemical	7.10 to 8.50
No. 2 cast	5.00 to 5.25

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$9.00 to \$10.00
No. 1 machinery cast	9.00 to 10.00
Stove plate	5.00 to 5.25
Railroad malleable	13.00 to 13.50

## BIRMINGHAM

### No Improvement in Pig Iron, Steel or Scrap Sales

BIRMINGHAM, June 9.—Sales of pig iron have not improved. The market continues spotty and inactive. New tonnage is in small lots and irregular. Quotations remain at \$12 to \$13. Production in May ran ahead of shipments, and this month there will be a curtailment in output. Sloss-Sheffield Steel & Iron Co. is slowing up production by banking a furnace for several days at a time. Gulf States Steel Co. is planning to blow out its stack on June 15 for at least 90 days. Thirteen furnaces continue in operation.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$12.00 to \$13.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50 to 13.50
Basic	12.00 to 13.00

### CAST IRON PIPE

Expectations of better tonnage have not yet materialized, and current business is still disappointing. Orders are mostly for small amounts and do not provide much of an accumulation of forward tonnage. Plant operations continue around 50 per cent, and prices at \$35 to \$36.

### FINISHED STEEL

Improved inquiries have not yet been translated into increased tonnage. Some fair-sized tonnages are in prospect, but there is uncertainty as to when these will be available. The

Seaboard Air Line Railroad has placed its third 1931 rail order with the Tennessee company, this being for about 6000 tons. Fabricators of the Birmingham district had a quiet week, with only a few small orders. The Tennessee company is alternately operating four and five open-hearths at Ensley and four at Fairfield; the Gulf States Steel two at Alabama City.

### COKE

Contract shipments constitute about the only activity in the coke market, and these are at a minimum. Inquiry and sales are scarce. Quotations remain at \$5.

### OLD MATERIAL

Demand is extremely quiet, with the mills out of the market and foundries buying only occasionally. Shipments on contracts are also slow. A number of downward price revisions have been made.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	\$9.50 to \$10.00
Scrap steel rails	10.00
Short shoveling turnings	7.50
Cast iron borings	(No market)
Stove plate	7.00
Steel axles	15.00 to 16.00
Iron axles	18.00
No. 1 railroad wrought	8.00
Rails for rolling	11.50 to 12.00
No. 1 cast	9.50
Tramcar wheels	10.00 to 10.25
Cast iron borings, chem.	13.50



## CINCINNATI

### Pig Iron Demand Small But Steady—Orders for Sheets Decline

CINCINNATI, June 9.—Demand for pig iron in this district continues to hold to a level of 1500 to 2000 tons weekly. Last week's orders of district furnace representatives totaled about 1750 tons, of which 200 tons in scattered carload lots went to Southern furnaces. Inquiry has slackened, largely because the present competitive solicitations of melters leaves them in full possession of current information about prices. Accordingly, they enter the market as the need arises fully informed as to what the quotations will be. Except for one order for 300 tons of Northern foundry iron from a southern Ohio consumer, the business placed last week was in carload lots. The melt continues to be very low, with foundries running only a few small heats weekly.

Prices per gross ton, deliv'd Cincinnati:  
Ala. fdy., sil. 1.75 to 2.25.....\$14.69  
Ala. fdy., sil. 2.25 to 2.75..... 15.19  
Tenn. fdy., sil. 1.75 to 2.25..... 14.69  
S'th'n Ohio silvery, 8 per cent..... 23.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

### FINISHED STEEL

District sheet mill operators report that demand last week declined slightly from that of the preceding week. This recession, however, was anticipated, since consumers generally reduce their purchases during the vacation period. Automobile manufacturers have reduced their specifications. Demand from the road construction field is good. Mills continue to operate slightly above 50 per cent level.

## PACIFIC COAST

SAN FRANCISCO, June 6.—Except for public works projects, which call for a sizable tonnage of steel in the aggregate, little activity is noted. The largest award of the week was 800 tons for the new Post Office in Oakland, Cal., booked by Judson-Pacific Co. No change is noted in the price structure.

### BARS

Merchant steel bars continue to move in small lots only. Mill prices hold at 2.10c., c.i.f. Awards of reinforcing steel totaled less than 750 tons. The Pioneer Sand & Gravel Co. took 125 tons for a plant in Seattle for the Tea Garden Products Co. Unnamed interests secured 245 tons for a bridge over the Virgin River in Nevada; 200 tons for an apartment house on San Marino Avenue, Los Angeles, and 150 tons for the Institute for Women at

### Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinf. bars.....	3.15c.
Rail steel reinf. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	3.90c.
Galv. sheets (No. 24).....	4.40c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in., 4-in.....	\$16.50
Seamless steel boiler tubes, 2-in., 4-in.....	34.50
	17.50
	36.00

### OLD MATERIAL

The scrap market is without feature. Dealers are buying warily, and relatively no scrap is being piled in the yards. Some mills are holding up shipments, but in one or two instances some material is being accepted on old commitments.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$8.25 to \$8.75
Scrap rails for melting.....	10.25 to 10.75
Loose sheet clippings.....	4.50 to 5.00
Bundled sheets.....	7.75 to 8.25
Cast iron borings.....	4.75 to 5.25
Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	6.75 to 7.25
No. 2 busheling.....	4.25 to 4.75
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	9.50 to 10.00
No. 2 railroad wrought.....	8.25 to 8.75
Short rails.....	13.00 to 13.50
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	12.50 to 13.00
No. 1 railroad cast.....	11.50 to 12.00
Burnt cast.....	5.25 to 5.75
Stove plate.....	5.25 to 5.75
Brake shoes.....	5.25 to 5.75
Agricultural malleable.....	10.00 to 10.50
Railroad malleable.....	11.00 to 11.50

### Public Works Projects Feature of Demand for Steel Products

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25.....	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25.....	22.00 to 24.00

\*Delivered San Francisco.  
\*\*Duty paid, f.o.b. cars San Francisco.

Techachapi, Cal. Bids are being taken on 1000 tons for the Marine Hospital, Seattle. Bids will be opened June 24 on 340 tons for the Albro Place via-

### Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	2.50c.
Soft steel bars.....	2.50c.
Black sheets (No. 24).....	4.15c.
Blue ann'd sheets (No. 10).....	3.05c.
Galv. sheets (No. 24).....	4.65c.
Struc. rivets, 1/2-in. and larger.....	5.00c.
Com. wire nails, base per keg.....	\$3.35
Cement c'd nails, 100 lb. keg.....	3.35

duct, Seattle. Out-of-stock prices are unchanged in the Los Angeles district at 2.50c., base, on carload lots, while San Francisco quotations hold at 2.60c., base.

### PLATES

The Willamette Iron & Steel Works was awarded contract for four steel derrick scows for the United States Engineer Office, Portland, involving 120 tons of plates. Several small tank projects were placed. Bids have been opened on 500 tons of 24 and 30-in. welded steel pipe for Vancouver, B. C. The usual quotation is 2c., c.i.f.

### SHAPES

Demand for structural shapes has eased off. Few large projects are in the market. McClintic-Marshall Corp. took 270 tons for an apartment house on Ellis Street, San Francisco. The Virginia Bridge & Iron Co. booked 100 tons for the Pilchuck River bridge in Washington, and an unnamed interest secured 500 tons for an apartment house on San Marino Avenue, Los Angeles. San Francisco has rescinded the award recently made to Barrett & Hilp for the Islais Creek bridge, calling for 1100 tons. New bids are to be called for shortly. Bids are being taken on 200 tons for the Girls' High School, San Francisco. Bids have been opened on two bridges in Apache County, Ariz., for the United States Bureau of Public Roads, involving 398 tons of sheet steel piling and 223 tons of shapes. Plain material continues to range from 2.05c. to 2.15c., c.i.f.

### CAST IRON PIPE

Los Angeles has awarded 319 tons of 12-in. centrifugal pipe to the National Cast Iron Pipe Co.; 478 tons to the United States Pipe & Foundry Co. and 637 tons to the American Cast Iron Pipe Co. C. G. Claussen & Co. booked 199 tons of 6-in. Class B pipe for Calistoga, Cal. Los Angeles will open bids June 11 on 483 tons of 2-in. cast iron pipe, and Long Beach, Cal., will open bids June 19 on 105 tons of 2-in. pipe.

### SHEETS

Movement of blue annealed, black and galvanized sheets continues to be confined to small lots for immediate shipment. Prices on No. 24-gage galvanized sheets hold at 3.50c., c.i.f.; black sheets, No. 24 gage, are quoted at 3c., and blue annealed sheets, No. 10 gage, hold at 2.50c., c.i.f.

Manufacturers of wire screen cloth have been invited to attend a meeting at the Hotel Biltmore, New York, 10.30 a. m., daylight saving time, Thursday, June 18, to consider proposal for simplification of this commodity, the meeting to be held under the auspices of the Division of Simplified Practice, Department of Commerce.

# ST. LOUIS

## Steel Production Curtailed—Pig Iron Buying Light—Scrap Weak

ST. LOUIS, June 9.—Pig iron business is still largely confined to the buying of carload lots for spot delivery. Makers regard as significant the fact that melters making such purchases seem to be little concerned with the price. The melt of the open-hearth furnaces in the district was further curtailed during the week with the closing down of three furnaces. Gray iron foundries are said to be doing a small amount of business, but price competition is unusually keen. Malleable plants are quiet. Shipments of the St. Louis Gas & Coke Corp. during May were equal to those of April. Prices are unchanged.

### Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

### FINISHED STEEL

Buying of plates, shapes and bars from mills was reported to be slightly better during the last week than for some time. Warehouse business during May was better than for April, and June has opened up well. The oil field trade is exceedingly dull. Small fabricators of sheet metal and other products report better inquiry. Bids were opened Thursday for the Illinois Terminal Warehouse Co. building, requiring 3660 tons of reinforcing bars, according to revised specifications.

### OLD MATERIAL

With the shutting down of three open-hearth furnaces during the week, there was a decrease in an already low demand for scrap, and the market continues weak. Selected heavy melting steel was off 25c. a ton. The only buying is by dealers, who still have a few outstanding contracts.

Railroad lists: Chicago & North-

western, 2410 tons; Louisville & Nashville, 1345 tons; Chicago, Rock Island & Pacific, 46 carloads, and Chicago & Eastern Illinois, 34 carloads.

### Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$8.25 to \$8.75
No. 1 heavy melting or shoveling steel	8.00 to 8.50
No. 2 heavy melting or shoveling steel	7.25 to 7.75
No. 1 locomotive tires	10.00 to 10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	9.00 to 9.50
Railroad springs	10.00 to 10.50

Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	6.00 to 6.50
Cast iron borings and shoveling turnings	5.50 to 6.00
Iron rails	8.00 to 8.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	2.75 to 3.25
Heavy turnings	6.00 to 6.50
Steel car axles	12.50 to 13.00
Iron car axles	17.50 to 18.00
Wrot. iron bars and trans.	9.00 to 9.50
No. 1 railroad wrought	6.00 to 6.50
Steel rails, less than 3 ft.	11.00 to 11.50
Steel angle bars	8.50 to 9.00
Cast iron carwheels	7.00 to 7.50
No. 1 machinery cast	8.00 to 8.50
Railroad malleable	8.25 to 8.75
No. 1 railroad cast	8.00 to 8.50
Stove plate	7.00 to 7.50
Relay, rails, 60 lb. and under	16.00 to 16.50
Relay, rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	7.50 to 8.00

# BUFFALO

## Bethlehem Blows Out Blast Furnace—Republic Adds One Open-Hearth

BUFFALO, June 9.—Sales of pig iron in this district during the past week were between 2000 and 3000 tons. Apparently Buffalo furnaces were not successful in cutting in on any of the larger Eastern inquiries recently, having been subjected to stiff competition, particularly from Port Henry. No sizable inquiries are in sight. There has been a tapering of the melt. The Lackawanna plant of the Bethlehem Steel Co. has reduced its blast furnace operation, with only one furnace now blowing. This reduces the district total to three active stacks.

### Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

### FINISHED STEEL

Republic Steel Corp. has placed an additional open-hearth furnace in operation, making four active. Lackawanna plant of the Bethlehem Steel Co. continues to operate at 33 1/3 per cent, with eight open-hearths going. Wickwire-Spencer is using three, capacity operation, and the Gould Coupler Co. is operating one part time. The Seneca Iron & Steel Co. is operating 50 per cent, as is the Buffalo Bolt Co. There is very little activity in structural steel and reinforcing bars, with the exceptions of small lots.

### OLD MATERIAL

The only transactions of interest in this market the past week were purchases by two consumers of tonnages of mixed borings and turnings and cast iron borings. One concern bought 1000 tons at \$6 and the other bought 2000 tons at \$6.50. The difference in price is attributable to the chemical analysis required by one consumer. Prices of \$9.50 for No. 1 heavy melting steel and \$8 for No. 2

heavy melting steel appear to be firm, with some small lots being taken at these prices.

### Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$9.50 to \$10.00
No. 2 heavy melting scrap	8.00 to 8.50
Scrap rails	10.00 to 10.50
Hydraul. comp. sheets	8.50 to 9.00
No. 2 hydraul. comp. sheets	8.00 to 8.50
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	8.50
No. 1 busheling	8.50
Hvy. steel axle turnings	8.50 to 9.50
Machine shop turnings	4.50 to 5.00
No. 1 railroad wrought	7.50 to 8.00
Acid Open-Hearth Grades:	
Knuckles and couplers	12.00 to 12.50
Coil and leaf springs	12.00 to 12.50
Rolled steel wheels	12.00 to 12.50
Low phos. billet and bloom ends	13.00 to 14.00
Electric Furnace Grades:	
Short shov. steel turnings	6.00 to 6.50
Blast Furnace Grades:	
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	4.50 to 5.00
Rolling Mill Grades:	
Steel car axles	15.00 to 15.50
Iron axles	16.00 to 16.50
Cupola Grades:	
No. 1 machinery cast	10.00 to 10.50
Stove plate	8.00 to 8.25
Locomotive grate bars	7.00 to 7.50
Steel rails, 3 ft. and under	13.00 to 13.50
Cast iron carwheels	11.50 to 12.00
Malleable Grades:	
Industrial	10.50 to 11.00
Railroad	10.50 to 11.00
Agricultural	10.50 to 11.00
Special Grades:	
Chemical borings	9.00 to 9.50

### Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.60c.
Blue ann'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.65c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
Per Cent Off List	
Tank rivets, 3/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10

### Warehouse Prices, f.o.b. Buffalo

Base per Lb.	
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.25c.
Black sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Blue ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$2.60
Black wire, base per 100 lb.	3.20



## YOUNGSTOWN

YOUNGSTOWN, June 8.—While business in this district has definitely been reduced to the usual summer sluggishness, curtailment of orders has hardly been as sharp as might be expected. Open-hearth activity is still moving up and down from week to week, with this week's average about 40 per cent. The number of blast furnaces in operation has been comparatively stable since February, and in most cases furnaces have been banked rather than blown out when necessity for curtailment in pig iron output has arisen. The schedules of finishing mills are erratic. Some companies are not beginning to operate their sheet and strip mills until late in the week, with the result that what appears to be an operation of three or four turns turns out to be three or four days. Under these circumstances it is difficult to make a fair estimate of finishing mill activity, but the district as a whole is running at about 45 per cent of capacity.

Youngstown mills are benefiting considerably by the relatively high activity of local fabricators of steel building products and kindred lines, but the requirements of these companies are not sufficient to offset recent declines in the needs of automobile and parts makers. While inquiry for line pipe continues good, only two or three sizable orders have come to Valley mills, and activity in this department is still curtailed. Butt-weld pipe going to the building industry continues very dull. The tin mill at Warren is running at a satisfactory rate for this season of the year, but specifications have not been sufficient to schedule output more than a week in advance. Fabricators of steel plate are generally inactive and, with the exception of reinforcing bars, general demand for the heavy hot-rolled products has been rather disappointing so far this year.

From the standpoint of price, few new developments are reported. Consumers are showing no interest in their third quarter requirements and, while producers of sheets and strip steel have opened their books for the next three months, no active solicitation of business is reported. Sheet makers hope to make their new schedule effective for the third quarter. Prices announced recently by a leading producer involve advances of \$2 to \$5 a ton on some grades of sheets. Makers of hot-rolled strip are generally asking 1.55c. and 1.65c., Pittsburgh, on third quarter contracts, but these prices have not been tested by tonnage buying. Producers of bars are willing to take forward business at 1.65c., Pittsburgh, and specifications against contracts at this level have recently been less difficult to obtain.

The market on raw materials is

## Steel Business Characterized by Usual Summer Sluggishness

very dull, with consumers showing no interest in purchases of scrap or pig iron. The price of basic pig iron is still largely dependent upon steel company quotations, and merchant producers in the district are not willing to quote freely on such inquiries as are out. Steel scrap prices have achieved some stability at around \$10.50.

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## Canada

### Structural Steel has Brightest Prospects

TORONTO, June 9.—New business is low in the pig iron market and has been gradually tapering off for some time. Melters are concerned with immediate needs only and are not showing interest in future requirements. Sales for the week were almost exclusively in one or two car lots. No large contracts for future delivery have been made for several weeks, but melters are still taking scheduled deliveries on old contracts.

#### Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable .....	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable .....	24.00
Basic .....	20.50

### STRUCTURAL STEEL

While there has been a slowing down in business in this market within the past few months, there was a slight upswing during the week, when contracts were closed involving some 8000 tons. About half of the total was in lots of 100 tons or less. Considerable business is in prospect and early closing of a large tonnage is expected. Tenders for some of the big bridges across the main rivers in Quebec, for which the Legislature last session voted \$8,000,000, will be called for early this summer. The Government has given approval to a bill to permit the erection of a bridge across the St. Lawrence River at Caughnawaga, and another bill to permit a bridge to connect the island of Orleans with the north coast has been introduced. Other bridges to be constructed include one over the Richelieu at Sorel, over the Yamaska River and over the St. Francis River.

### OLD MATERIAL

Very little activity in the scrap market is reported by Toronto and Montreal dealers. Sales for the week were at the low point for the year,

and there is nothing to indicate early improvement. Prices are unchanged.

#### Dealers' buying prices for old material:

##### Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap .....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Boiler plate .....	3.50	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings .....	2.00	2.00
Steel borings .....	2.00	2.00
Wrought pipe .....	7.00	9.00
Steel axles .....	7.00	11.00
Axles, wrought iron.....	10.00	10.00
No. 1 machinery cast.....	8.00	8.00
Stove plate .....	8.50	8.50
Standard carwheels.....	8.00	8.00
Malleable .....	8.00	8.00

##### Per Net Ton

No. 1 mach'ry cast.....	11.00	....
Stove plate .....	9.00	....
Standard carwheels.....	10.00	....
Malleable scrap.....	9.00	....

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### Further Declines in Scrap at Detroit

DETROIT, June 9.—In the absence of buying on the part of steel mills, heavy melting steel and hydraulic compressed sheets have declined 50c. and 25c. a ton, respectively. Sheet clips, flashings, No. 1 busheling and borings and short turnings likewise are off 25c. to 50c. a ton. At current levels dealers are purchasing scrap and laying it down in their yards in anticipation of an upturn in the late summer or early fall.

#### Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel .....	\$7.00 to \$7.50
Borings and short turnings .....	3.50 to 4.00
Long turnings .....	3.00 to 3.50
No. 1 machinery cast.....	8.25 to 8.75
Automotive cast.....	11.00 to 11.50
Hydraul. comp. sheets.....	6.25 to 6.75
Stove plate .....	6.25 to 6.50
New No. 1 busheling.....	6.00 to 6.50
Old No. 2 busheling.....	2.50 to 3.00
Sheet clippings.....	3.75 to 4.25
Flashings .....	6.00 to 6.50

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### Pig Iron, Steel Output in Canada Lower in April

TORONTO, June 9.—Production of pig iron in Canada in April amounted to 53,792 gross tons, compared with 57,110 tons in March. The daily rate of production in April was 1793 tons, against 1842 tons in the month preceding.

Production of ferroalloys in April reached the highest rate for any month of the year, with a total of 4605 tons, which compares with 4526 tons for March.

Output of steel ingots and direct steel castings for April amounted to 91,461 tons, equal to a daily rate of 3049 tons, which was 5 per cent under the daily rate of 3205 tons in March.

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Production of farm equipment and related products in 1930 amounted to \$505,816,292, compared with \$607,063,605 in 1929 and \$524,255,416 in 1928, according to the Bureau of Census.



# ▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

## MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms	
	Per Gross Ton
Revolving, 4-in. and under 10-in., Pittsburgh	\$29.00 to \$30.00
Revolving, 4-in. and under 10-in., Youngstown	29.00 to 30.00
Revolving, 4-in. and under 10-in., Cleveland	29.00 to 30.00
Revolving, 4-in. and under 10-in., Chicago	31.00 to 32.00
Forging quality, Pittsburgh	35.00 to 36.00

Sheet Bars (Open-Hearth or Bessemer)	
	Per Gross Ton
Pittsburgh	\$29.00 to \$30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Slabs (8 in. x 2 in. and under 10 in. x 10 in.)	
	Per Gross Ton
Pittsburgh	\$29.00 to \$30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Skelp (F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.65c.
Universal	1.65c.
Sheared	1.65c.

Wire Rods (Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	35.00

## PRICES OF RAW MATERIAL

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria. 8c. to 9c.	
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.50

Chromes	
	Per Gross Ton
Chrome ore, 45% Cr <sub>2</sub> O <sub>3</sub> crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr <sub>2</sub> O <sub>3</sub> crude, c.i.f. Atlantic seaboard	22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.40
Foundry, f.o.b. Connellsville prompt	3.25 to 4.75
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd.	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 3/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	75c. to 85c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*80.00 to 85.00

\*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00

Bessemer Ferrosilicon	
	Per Gross Ton Furnace
10%	\$35.00
11%	37.00
12%	14 to 16%

F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
10%	\$25.00
11%	26.00
12%	27.00

Silvery Iron	
	Per Gross Ton
6%	\$19.00 to \$21.00
7%	19.50 to 21.50
8%	20.00 to 22.00
9%	20.50 to 22.50
10%	21.00 to 23.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys	
	Per Gross Ton
Ferrotungsten, per lb. contained metal del'd, carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrosilicon, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrosilicon, 2% carbon	17.00c. to 17.50c.
Ferrosilicon, 1% carbon	19.00c. to 20.00c.
Ferrosilicon, 0.10% carbon	24.50c. to 26.00c.
Ferrosilicon, 0.06% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50

Silico-manganese, gross ton, delivered:	
2.50% carbon grade	\$105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Fluxes and Refractories	
Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$14.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-Heat	Intermediate
Duty Brick	Heavy Duty Brick
Pennsylvania	\$40.00 to \$43.00 \$32.00 to \$35.00
Maryland	40.00 to 43.00 32.00 to 35.00
New Jersey	40.00 to 43.00
Ohio	40.00 to 43.00 32.00 to 35.00
Kentucky	40.00 to 43.00 32.00 to 35.00
Missouri	40.00 to 43.00 32.00 to 35.00
Illinois	40.00 to 43.00 32.00 to 35.00
Ground fire clay, per ton	6.50

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

## MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	70c. to 6.75c. per lb. off list

\*F.o.b. Chicago, New York and Pittsburgh.  
†Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagons nuts	73
Semi-finished hexagons castellated nuts, S.A.E. 73	73
Stove bolts in packages, P'gh. 80, 10, 10 and 5	73
Stove bolts in packages, Chicago. 80, 10, 10 and 5	73
Stove bolts in packages, Cleveland. 80, 10, 10 and 5	73
Stove bolts in bulk, P'gh. 80, 10, 10, 5 and 2 1/2	73
Stove bolts in bulk, Chicago. 80, 10, 10, 5 and 2 1/2	73
Stove bolts in bulk, Cleveland. 80, 10, 10, 5 and 2 1/2	73
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets (1/2-in. and larger)	
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets (3/4-in. and smaller)	
	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws	
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

# Mill Prices of Finished Iron and Steel Products

## Iron and Steel Bars

Soft Steel		Base per Lb.
F.o.b. Pittsburgh mill	1.65c.	
F.o.b. Chicago	1.70c. to 1.80c.	
Del'd Philadelphia	1.94c. to 1.99c.	
Del'd New York	1.98c. to 2.03c.	
F.o.b. Cleveland	1.65c. to 1.70c.	
F.o.b. Lackawanna	1.75c. to 1.80c.	
F.o.b. Birmingham	1.80c.	
C.i.f. Pacific ports	2.25c.	
F.o.b. San Francisco mills	2.25c.	

Billet Steel Reinforcing		Base per Lb.
F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c. to 1.65c.	
F.o.b. Birmingham, mill lengths	1.75c.	

Rail Steel		Base per Lb.
F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.	
F.o.b. Chicago Heights mill	1.60c. to 1.65c.	
Del'd Philadelphia	1.84c. to 1.89c.	

Iron		Base per Lb.
Common iron, f.o.b. Chicago	1.70c. to 1.80c.	
Refined iron, f.o.b. P'gh mills	2.75c.	
Common iron, del'd Philadelphia	2.09c.	
Common iron, del'd New York	2.14c.	

## Tank Plates

Base per Lb.	
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
F.o.b. Birmingham	1.80c.
Del'd Cleveland	1.83 1/2c.
Del'd Philadelphia	1.85 1/2c.
F.o.b. Coatesville	1.75c.
F.o.b. Sparrows Point	1.75c.
F.o.b. Lackawanna	1.75c.
Del'd New York	1.93c.
C.i.f. Pacific ports	2.05c.

## Structural Shapes

Base per Lb.	
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
F.o.b. Birmingham	1.80c.
F.o.b. Lackawanna	1.75c.
F.o.b. Bethlehem	1.75c.
Del'd Cleveland	1.83 1/2c.
Del'd Philadelphia	1.76c. to 1.81c.
Del'd New York	1.90 1/2c.
C.i.f. Pacific ports	2.15c. to 2.25c.

## Hot-Rolled Hoops, Bands and Strips

Base per Lb.	
6 in. and narrower, P'gh	1.60c. to 1.65c.
Wider than 6 in., P'gh	1.50c. to 1.55c.
6 in. and narrower, Chicago	1.65c. to 1.75c.
Wider than 6 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.80c. to 1.90c.
Cooperage stock, Chicago	1.80c. to 1.90c.

## Cold-Finished Steel

Base per Lb.	
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	2.45c. to 3.40c.
Strips, P'gh	2.15c.
Strips, Cleveland	2.15c.
Strips, deliv'd Chicago	2.45c.
Strips, Worcester	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.20c.

\*According to size.

## Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland) To Manufacturing Trade	
Bright wire	2.20c.
Spring wire	3.20c.

## To Jobbing Trade

Base per Lb.	
Smooth annealed wire	2.25c. to 2.35c.
Smooth galvanized wire	2.70c. to 2.80c.
Polished staples	2.25c. to 2.35c.
Galvanized staples	2.50c. to 2.60c.
Barbed wire, galvanized	2.45c. to 2.55c.
Woven wire fence, per net ton	\$60.00

Base per Keg	
Standard wire nails	\$1.80 to \$1.90
Smooth coated nails	1.80 to 1.90
Galvanized nails	3.80 to 3.90

## To Retail Trade

Base per Lb.	
Bright wire	2.30c.
Smooth annealed wire	2.40c.
Smooth galvanized wire	2.90c.

Base per Keg	
Standard wire nails	\$1.90 to \$2.00
Cement coated nails	1.90 to 2.00
Galvanized nails	3.90 to 4.00

Base per Lb.	
Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized	2.65c.
Woven wire fence, per net ton	\$65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

## Light Plates

Base per Lb.	
No. 10, blue annealed, f.o.b. P'gh	1.85c.
No. 10, blue annealed, f.o.b. Chicago dist.	1.95c.
No. 10, blue an'd, del'd Phila.	2.14c. to 2.19c.
No. 10, blue annealed, B'ham	2.00c. to 2.05c.
No. 10, blue annealed, Pacific Coast ports	2.50c.

## Sheets

Blue Annealed		Base per Lb.
No. 13, f.o.b. P'gh	2.00c.	
No. 13, f.o.b. Chicago dist.	2.10c.	
No. 13, del'd Philadelphia	2.29c.	
No. 13, blue annealed, B'ham	2.15c.	

Box Annealed, One Pass Cold Rolled		Base per Lb.
No. 24, f.o.b. Pittsburgh	2.15c. to 2.25c.	
No. 24, f.o.b. Chicago dist. mill	2.35c.	
No. 24, del'd Philadelphia	2.44c. to 2.54c.	
No. 24, f.o.b. Birmingham	2.40c.	
No. 24, c.i.f. Pacific Coast ports	3.00c.	

## Steel Furniture Sheets

No. 24, f.o.b. P'gh	3.40c.
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## Galvanized

No. 24, f.o.b. Pittsburgh	2.75c. to 2.80c.
No. 24, f.o.b. Chicago dist. mill	2.90c.
No. 24, del'd Cleveland	2.93 1/2c. to 2.98 1/2c.
No. 24, del'd Philadelphia	3.04c. to 3.09c.
No. 24, f.o.b. Birmingham	2.85c. to 2.90c.
No. 24, c.i.f. Pacific Coast ports	3.50c.

## Continuous Mill Sheets

No. 10 gage	1.70c.
No. 13 gage	1.85c.

## Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill	2.65c. to 2.75c.

## Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.
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## Long Ternes

No. 24, 8-lb. coating, f.o.b. mill:	
Unassorted	3.10c.
Assorted	3.20c.
Primes only	3.30c.

## Vitreous Enameling Stock

No. 10, Pittsburgh	2.90c.
No. 20, Pittsburgh	3.40c.

## Tin Plate

Base per Box	
Standard cokes, f.o.b. P'gh district mills	\$5.00
Standard cokes, f.o.b. Gary	\$1.10

## Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.90	40-lb. coating I.C. 17.80

## Alloy Steel Bars

(F.o.b. maker's mill)	
Alloy Quantity Bar Base, 2.65c. per Lb.	
S.A.E. Series	Alloy
Numbers	Differential
2000 (1 1/2% Nickel)	\$0.25
2100 (1 1/4% Nickel)	0.55
2300 (3 1/2% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20

4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05

5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95

9250 Silicon Manganese Spring Steel (flat)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

## Rails

Per Gross Ton	
Standard, f.o.b. mill	\$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

## Track Equipment

Base per 100 Lb.	
Spikes, 3/4 in. and larger	\$2.70
Spikes, 1/2 in. and larger	2.70

Spikes, boat and barge	\$2.90
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

## Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld		Iron	
Steel	Galv.	Black	Galv.
Inches		Inches	
1/2	47	1/2 and 3/4	+36
3/4	53	3/4	23
1	58	1 and 1 1/4	11
1 1/4	62	1 1/4	31
1 1/2	64	1 1/2 and 2	18

Lap Weld		Iron	
Steel	Galv.	Black	Galv.
Inches		Inches	
2	57	2	23
2 1/2 to 6	61	2 1/2 to 3 1/2	13
7 and 8	58	4 to 6	30
9 and 10	56	7 and 8	20
11 and 12	55	9 to 12	26

Butt Weld, extra strong, plain ends		Iron	
Steel	Galv.	Black	Galv.
Inches		Inches	
1 1/2	43	1 1/2 and 3/4	+48
1 1/2 to 3	49	3/4	23
3 1/2	55	1 1/2	28
4	60	1 to 2	34
1 to 1 1/2	62		
2 to 3	63		

Lap Weld, extra strong, plain ends		Iron	
Steel	Galv.	Black	Galv.
Inches		Inches	
2	55	2	29
2 1/2 to 4	59	2 1/2 to 4	20
4 1/2 to 6	58	4 1/2 to 6	33
7 to 8	54	7 and 8	31
9 and 10	47	9 to 12	21
11 and 12	46		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2 1/2%, and on galvanized by 1 1/2 points, with supplementary discounts of 5 and 2 1/2%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

## Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2 1/2 in.	38	1 1/2 in.	1
2 1/2 in.—2 3/4 in.	46	1 3/4 in.	8
3 in.—2 3/4 in.	52	2 in.—2 1/4 in.	13
3 1/4 in.—3 1/2 in.	54	2 1/4 in.—2 3/4 in.	16
4 in.	57	2 3/4 in.—3 in.	17
4 1/2 in. to 6 in.	46	3 1/4 in. to 3 1/2 in.	18
		4 in.	20
		4 1/2 in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

## Standard Commercial Seamless Boiler Tubes

Cold Drawn		Hot Rolled	
1 in.	61	3 in.	46
1 1/4 to 1 1/2 in.	53	3 1/4 to 3 1/2 in.	48
1 1/2 in.	37	4 in.	51
2 to 2 1/4 in.	32	4 1/2, 5 and 6 in.	40
2 1/4 to 2 3/4 in.	40		

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

## Seamless Mechanical Tubing

Per Cent Off List	
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

## The Iron Age, June 11, 1931—1949

# ▲▲▲ Non-Ferrous Metal Markets ▲▲▲

## Copper and Tin at New Lows—Zinc Advances— Lead Firm

NEW YORK, June 9.

### COPPER

On June 3, several thousand tons of electrolytic copper was sold at 8c., delivered in the Connecticut Valley, establishing a low price for all time. Custom smelters took most of this business. Since then metal at that level has disappeared, the price rebounding to 8.25c. The next day the quotation of Copper Exporters, Inc., was reduced to 8.52½c., c.i.f. usual European ports, and the primary producers automatically went to the 8.25c. price. Sales, both foreign and domestic, particularly the former, have been quite large. About 16,500 tons has been contracted for for shipment abroad thus far in June, exceeding any month's volume for the same period since February. Domestic users have been quite active, making purchases through the third quarter. Some sellers are taking last quarter business and there are inquiries for the first quarter of next year, with few, if any, sellers. Statistics for May are expected by the end of the week, and it is thought by many that they will be unfavorable and will show an increase rather than a decrease in stocks of refined metal. Lake copper is moderately active at 8.25c. to 8.37½c., delivered.

### TIN

Selling at 22.35c., New York, during the past week, spot Straits tin made another new low record since January, 1899, the previous low price the week before having been 22.40c., New York. Even at these low levels, buying is exceedingly light. On only one day last week, June 4, was any business of consequence reported, sales totaling about 150 tons. This was mostly for nearby delivery and was bought by consumers. Indications in London are that the price has been pegged around £102 a ton for future standard tin because, at this level, large buying orders are said to appear from the "Group." Quotations in London today were very close to those of a week ago, with spot standard quoted at £100 15s., future standard at £102 7s. 6d. and spot Straits at £102 10s. The Singapore market today was £103 10s. Stocks in British

### THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	June 9	June 8	June 6	June 5	June 4	June 3
Lake copper, New York.....	8.37½	8.37½	8.37½	8.37½	8.37½	8.37½
Electrolytic copper, N. Y.*.....	8.00	8.00	8.00	8.00	8.00	7.75
Straits tin, spot, N. Y. ....	22.45	22.30	....	22.40	22.35	22.35
Zinc, East St. Louis.....	3.25	3.20	3.20	3.20	3.20	3.20
Zinc, New York.....	3.60	3.55	3.55	3.55	3.55	3.55
Lead, St. Louis.....	3.60	3.60	3.60	3.60	3.60	3.60
Lead, New York.....	3.75	3.75	3.75	3.75	3.75	3.75

\*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

warehouses for the week ended Saturday, June 6, increased 332 tons to a total of 30,939 tons.

### LEAD

Further buying of substantial quantities of lead by battery, cable and other consumers is reported as a feature of recent days. There has also been considerable carload and small lot contracting, and indications continue to point to a larger consumption in June than in May. Prices continue firm and unchanged at 3.75c., New York, or 3.60c., St. Louis.

### ANTIMONY

With demand light and stocks plentiful, Chinese metal is again a little

lower at 6.20c. a lb., New York, duty paid, for spot, and 6.15c. for futures.

### ZINC

After falling during the week to 3.20c., East St. Louis, prime Western zinc has firmed slightly to 3.25c., St. Louis, or 3.60c., New York. The reason appears to be a better feeling among sellers and less inclination to part with the metal. The better sentiment is due in some measure to the May statistics, which showed a slight decrease in stocks of all grades. The decrease was only 163 tons, but it is believed that the June statistics will be even more favorable. Ore at the close of last week was unchanged at \$20 to \$21 a ton, but the sales were

### New York, Chicago or Cleveland Warehouse

#### Delivered Prices, Base per Lb.

High brass.....	15.62½c.
*Copper, hot rolled, base sizes.....	18.12½c.
Seamless Tubes—	
Brass.....	20.50c.
Copper.....	20.62½c.
Brass Rods.....	13.87½c.
Brazed Brass Tubes.....	24.25c.

\*Extra for cold-rolled, 3c. per lb.

### New York Warehouse

#### Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	9.00c. to 9.50c.
Zinc sheets, open.....	10.00c. to 10.50c.

### Metals from New York Warehouse

#### Delivered Prices, per Lb.

Tin, Straits pig.....	24.00c. to 25.00c.
Tin, bar.....	26.00c. to 27.00c.
Copper, Lake.....	10.00c. to 10.50c.
Copper, electrolytic.....	9.50c. to 10.00c.
Copper, casting.....	9.25c. to 9.75c.
Zinc, slab.....	4.50c. to 5.50c.
Lead, American pig.....	4.75c. to 5.75c.
Lead, bar.....	6.75c. to 7.75c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Aluminum No. 1 ingots for remelting (guar- anteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy.....	23.00c. to 24.00c.
Babbitt metal, commercial grade.....	20.00c. to 30.00c.
Solder, ½ and ½.....	17.75c. to 18.75c.

### Metals from Cleveland Warehouse

#### Delivered Prices, per Lb.

Tin, Straits pig.....	27.25c.
Tin, bar.....	29.25c.
Copper, Lake.....	10.25c.
Copper, electrolytic.....	9.50c.
Copper, casting.....	9.00c.
Zinc, slab.....	5.50c.
Lead, American pig.....	4.75c. to 4.90c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	31.50c.
Solder, ½ and ½.....	19.00c.

### Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.25c.	7.00c.
Copper, hvy. and wire	6.00c.	6.75c.
Copper, light and bot- toms.....	5.00c.	5.75c.
Brass, heavy.....	3.25c.	4.00c.
Brass, light.....	2.50c.	3.50c.
Hvy. machine compo- sition.....	5.00c.	5.75c.
No. 1 yel. brass turn- ings.....	4.00c.	4.50c.
No. 1 red brass or compos. turnings..	4.50c.	5.25c.
Lead, heavy.....	2.50c.	3.00c.
Zinc.....	1.25c.	1.75c.
Sheet aluminum.....	10.00c.	12.00c.
Cast aluminum.....	5.00c.	7.50c.



larger than in some weeks, the total being 4340 tons. This is the largest for any week since late in April. Estimated stocks now stand at 63,500 tons, which is 4000 tons above the high total late in March this year.

#### NICKEL

Electrolytic cathodes are quoted at 35c. a lb., with shot and ingot nickel made from remelted electrolytic at 36c. a lb. for single lots of spot metal.

#### ALUMINUM

Virgin metal, 98 to 99 per cent pure, according to published prices, is 22.90c. a lb., delivered.



## Machine-Shop Topics at A. S. M. E. Meeting

(Concluded from page 1922)

General use of Class 2 and Class 3 specifications for screw thread work was emphasized. Economical production of threaded holes to Class 3 specifications has been made practical by the use of ground thread taps, which are now obtainable in all sizes. External threads are generally produced with adjustable tools either adjustable dies or thread milling machines, and there is no loss of production in holding the parts to reasonable limits. In many instances this member can be held to Class 3 specifications where it is desirable and economical to produce the hole to Class 2 specifications, said Mr. Bryant. The combination of Class 2 and Class 3 assembly naturally makes a better condition than the application of Class 2 to both members, and it is the economical solution of many problems, he added. In this connection it was stated that the establishment of a size between Classes 3 and 4, or an entire revision of the Class 4 series was being considered.

#### Uneconomical to Check Too Many Dimensions with One Gage

It is not economical to check too many dimensions with one gage. Except in the case of receiver gages which check the relation of all the important dimensions of a part, it is desirable that the gages check the individual dimensions, because of the tendency of operators to overlook or miss some point that is outside of the gage dimension.

It was pointed out that automatic and semi-automatic gaging machines with electrical indicating and selecting devices are finding more general use; for large volume continuous production such gages result in important savings.

Periodical inspection of gages, not only those used on the product but of the master or reference gage equip-

ment of a factory, was emphasized as a necessity for good production. An abstract of the small tool section of Mr. Bryant's paper, which was on "Small Tools and Gaging for Interchangeable Manufacture," will be given in a forthcoming issue of THE IRON AGE.

#### Developing Equipment Replacement Formulas

AN informal conference was held June 3 to obtain data on the practice of various industries in the selection and replacement of manufacturing equipment. This meeting, under the auspices of the committee on formulas of the A. S. M. E. materials handling division and the special research committee on measures of management, introduced a new activity that seems to hold much promise for both users and manufacturers of equipment.

It was pointed out that several equipment selection and replacement formulas have been developed. A number of these have been studied and were found to differ in some significant factors. From researches conducted for the committees by Prof. Fairfield Raymond, assistant professor of industrial research, Massachusetts Institute of Technology, it is hoped that existing formulas may be reduced to a common basis and that such formulas and the technique of applying them will appear to be so generally acceptable that, through the procedure of the American Standards Association, they may obtain recognition as a national standard. Approval of a standard by the A. S. A., it will be recalled, is based on general approval by all major groups concerned with such a standard, which in this case would seem to involve every branch of the manufacturing industry.

The agenda of the meeting comprised ten items intended to focus discussion on the major factors involved in any policy of machine selection and replacement. Items discussed included: What method should be employed in determining the economic life of equipment; to what extent is an equipment replacement policy influenced by salvage or resale values; and what constitutes obsolescence of productive equipment.

#### Simple Formulas Desirable

The desirability of having the conditions governing the replacement of equipment expressed by simple formulas was agreed on by many entering the discussion, such formulas to be easily understood and therefore likely to become more generally applied. In the discussion, the difference between depreciation and obsolescence was emphasized. Depreciation is due to general wearing out and can be computed or at least fairly well estimated. Attention was also called to the fact that obsolescence is the loss of value of equipment due mainly

to progress in the art concerned, which makes itself felt directly through inventions leading to the development of better equipment.

#### Study Strength of Vessels Under External Pressure

"The Collapsing Strength of Steel Tubes," by T. McLean Jasper and J. W. W. Sullivan, A. O. Smith Corp., Milwaukee, and the "Strength of Thin Cylindrical Shells Under External Pressure," by H. E. Saunders and D. W. Windenburg, United States Experimental Model Basin, Navy Yard, Washington, were outstanding contributions to a session held under the joint auspices of the applied mechanics division and the special research committee on the strength of vessels under external pressure.

A session under the auspices of the power division included a paper on "Load-Deflection Relations for Large Plain, Corrugated and Creased Pipe Bends," by E. T. Cope and E. A. Wert, Detroit Edison Co. "Stresses in Dished Heads of Pressure Vessels," by C. O. Rhys, Standard Oil Development Co., Elizabeth, N. J., and "Analysis of Stresses in Circular Plates and Rings," by E. O. Holmberg and K. Axelson, A. O. Smith Corp., featured a joint session of the petroleum and applied mechanics divisions. At another session—applied mechanics and mechanical springs research committee—Prof. H. C. Perkins, Sibley School of Engineering, Cornell University, contributed a paper on "Stresses in Curved Bars." Progress report No. 9 on "Comparative Tensile and Shearing Behavior in Springs" was also submitted at this session.

#### Plant Visits and Entertainment

Roy V. Wright, managing editor, *Railway Age* and president of the A. S. M. E., and E. E. Wilson, president of the Chance Vought Corp. and the Sikorsky Aviation Corp., were the principal speakers at the banquet and dance held on the evening of June 2. D. L. Brown, president, Pratt & Whitney Aircraft Co., introduced by C. R. Burt, president of the Pratt & Whitney Co., was toastmaster.

An elaborate program of music and addresses at the Horace Bushnell Memorial Auditorium, featured the evening of June 1. In addition to soloists the musical program included several numbers by the Pratt & Whitney choral club. Speakers included the Hon. Hiram Bingham, United States Senator from Connecticut, and F. M. Ryan, Bell Telephone Laboratories, who gave an illustrated lecture on radio telephony. Charles B. Cook, vice-president, Royal Typewriter Co., presided.

Joint excursions to the plants of the Pratt & Whitney Aircraft Co., Chance Vought Corp., Pratt & Whitney Co., Royal Typewriter Co. and Colt's Patent Fire Arms Mfg. Co. were enjoyed by many of those attending the meetings.

# FABRICATED STRUCTURAL STEEL

## Awards of 48,000 Tons Include 13,000-Ton New York Office Building—Inquiry Smallest of Year

FABRICATED structural steel awards of 48,000 tons compare with 81,500 tons a week ago, when 37,000 tons of welded pipe line in California was placed. The largest award this week is 13,000 tons for an office building in New York at Forty-second Street and Park Avenue, site of the former Hotel Belmont. Other sizable awards are 4080 tons of highway bridges in Illinois, and 4400 tons for a Post Office in Kansas City, Mo. A building in Chicago for the Marshall Field Estate, awarded a week ago, requires 25,000 tons of structural steel instead of 16,000 tons, originally reported.

New projects total 11,000 tons this week, the smallest of the year, comparing with 21,000 tons a week ago and 20,000 tons two weeks ago. Included in the total are 2000 tons for a Naval base at Honolulu, 1000 tons in a Chicago substation for the Commonwealth Edison Co., 565 tons in a bridge on Metropolitan Avenue, Brooklyn, and 600 tons for an office building at Church and Warren Streets, New York. Awards follow:

### North Atlantic States

HARTFORD, CONN., 200 tons, office building, to Palmer Steel Co.

MANCHESTER, CONN., 120 tons, library and Y.M.C.A. building, to an unnamed fabricator.

FRYEBURG, ME., 160 tons, State bridge, to Pittsburg-Des Moines Steel Co.

CAMBRIDGE, VT., 100 tons, State bridge, to Spooner Bridge Co.

NEW YORK, 13,000 tons, office building on site of Belmont Hotel, at Park Avenue and Forty-second Street, to McClintic-Marshall Corp. Decision to begin actual construction to be made about June 15.

ALBANY, N. Y., 325 tons, warehouse, to Eastern Bridge & Structural Co.

SYRACUSE, N. Y., 850 tons, office building for Syracuse Lighting Co., to Lackawanna Structural Steel Co.

STATE OF NEW YORK, 615 tons, highway bridge, to Lackawanna Structural Steel Co.

NEW YORK CENTRAL RAILROAD, 350 tons, building, to Eastern Bridge & Structural Co.

BROOKLYN, 800 tons, Livonia Avenue bridge, to American Bridge Co.

NEW YORK, 1255 tons, anchorage for Triboro Bridge, to American Bridge Co.

NEW YORK, 140 tons, private residence at 48 East Ninety-third Street, to Hinkle Iron Works; previously reported to Ingalls Iron Works.

PHILADELPHIA, 275 tons, building for Sylvaria Industrial Corp., to Belmont Iron Works.

DANNEMORA, N. Y., 250 tons, addition to Clinton Prison, to American Bridge Co.

DANNEMORA, N. Y., 730 tons, jail work for State prison, to Van Dorn Iron Works Co.

PITTSBURGH, 1580 tons, 10 barges for Island Creek Coal Co., to McClintic-Marshall Corp.

VERKES, PA., 165 tons, highway bridge, to McClintic-Marshall Corp.

COCKEYVILLE, MD., 500 tons, building for Masonic Grand Lodge, to Dietrich Brothers.

WASHINGTON, 315 tons, garage, to H. R. Blagg Co.

### The Southwest

TULSA, OKLA., 550 tons, coliseum, to Muskogee Iron Works.

OKLAHOMA CITY, 2200 tons, Skervin Hotel, to McClintic-Marshall Corp.

### Central States

DETROIT, 125 tons, retail store, to Whitehead & Kales Co.

SAGINAW, MICH., 300 tons, bridge, to American Bridge Co.

MARQUETTE, MICH., 250 tons, bridge, to Wausau Iron Works.

HAMILTON, OHIO, 100 tons, boiler house, to McClintic-Marshall Corp.

STATE OF ILLINOIS, 4080 tons, highway bridges, to Duffin Iron Co.

CHICAGO, 25,000 tons, Marshall Field Estate building, to McClintic-Marshall Corp.; previously reported at 16,000 tons.

CHICAGO, 160 tons, hangar for Century Airways, to American Bridge Co.

CHICAGO, 100 tons, bridge on Mannheim Road, to an unnamed bidder.

CHICAGO, 200 tons, Historical Society building, to Reuter Brothers, local.

WILLIAMSON COUNTY, ILL., 250 tons, bridge, to Vincennes Bridge Co.

CLARKSDALE, ILL., 200 tons, bridge, to Clinton Bridge Works.

KANSAS CITY, MO., 4400 tons, Post Office, reported to have been taken by McClintic-Marshall Corp.

LA SALLE, ILL., 700 tons, bridge, to Mount Vernon Bridge Co.

UNION PACIFIC, 110 tons, bridge, to McClintic-Marshall Corp.

PUERCO, COLO., 150 tons, furnace repairs for Colorado Fuel & Iron Co., to McClintic-Marshall Corp.

### Western States

EVERETT, WASH., 100 tons, Pilchuck River bridge, Snohomish County, to Virginia Bridge & Iron Co.

PORTLAND, ORE., 120 tons, plates, four steel derrick scows for U. S. Engineer Office, to Willamette Iron & Steel Works.

LOS ANGELES, 500 tons, apartment building, San Marino and Serrano Avenue, to an unnamed bidder.

OAKLAND, CAL., 800 tons, Post Office, to Judson-Pacific Co.

SAN FRANCISCO, 270 tons, apartment building, Ellis and Franklin Streets, to McClintic-Marshall Corp.

### Canada

NORTH VANCOUVER, B. C., 1500 tons, reconstruction of Second Narrows bridge span, to Dominion Bridge Co.

BECKER, ONT., 150 tons, bridge over Sydenham River, to Canadian Bridge Co.

LACHINE, QUE., 250 tons, Lachine tunnel under C. P. R. tracks, to Dominion Bridge Co.

### STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

#### North Atlantic States

PALMYRA, ME., 150 tons, State bridge.

BROOKLINE, MASS., 400 tons, theater.

STATE OF NEW YORK, 1000 tons, highway bridges.

NEW YORK, 500 tons, building for Union Theological Seminary.

BROOKLYN, 500 tons, bridge at Metropolitan Avenue.

NEW YORK, 600 tons, building at Church and Warren Streets for Stump & Walter Co.

NEW YORK, 150 tons, S. S. Kresge Co. store at 953 Morris Avenue.

WANTAGH, N. Y., unstated tonnage, grade crossing elimination for Long Island Railroad.

JAMAICA, N. Y., 565 tons, 10-story office building.

ERIE RAILROAD, unstated tonnage, passenger station at Jamestown, N. Y.

NEW YORK CENTRAL RAILROAD, unstated tonnage, bridge over Bronx River Parkway at Woodlawn, New York.

#### The South

STATE OF SOUTH CAROLINA, 500 tons, highway bridge.

#### Central States

CLEVELAND, 700 tons, juvenile court building; bids taken July 2.

PORT HURON, MICH., 400 tons, Seventh Street bridge.

CHICAGO, 1000 tons, Garland substation for Commonwealth Edison Co.

#### Western States

PHOENIX, ARIZ., 223 tons structurals and 398 tons sheet steel piling, Rio Puerco and Dry Creek bridges for United States Bureau of Public Roads in Apache County; bids opened.

SEATTLE, 100 tons, Marine hospital; sub-bids being taken.

SAN FRANCISCO, 1100 tons, Islais Creek bridge; general contract reported awarded to Barrett & Hilp has been rescinded and new bids will be called.

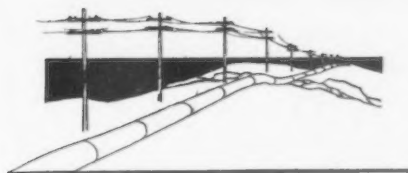
SAN FRANCISCO, 200 tons, Girls' High School; bids being taken.

LOS ANGELES, 500 tons, apartment building.

HONOLULU, 2000 tons, naval base.

#### Canada

TORONTO, 1000 tons, arena for Maple Leaf Gardens.



## PIPE LINES

### Inquiry from Insull Interests For a 200-Mile Line

PIPE line news this week is featured by an inquiry for 200 miles of 24 to 26-in. pipe, about 35,000 tons, for a Texas line to be laid by one of the Insull companies. Details of the week's developments follow:

The Insull interests, Chicago, are in the market for 200 miles of 24 to 26-in. gas line, calling for 35,000 tons, to be laid in Texas.

Fort Wayne, Ind., has in preparation a project which may call for 3000 tons of steel pipe.

Kentucky Natural Gas Co., Louisville, has petitioned for a franchise for a pipe line through portion of Vigo County, near Terre Haute, Ind. Company intends to continue line to Indianapolis, with spur lines for commercial distribution. Ohio Fuel Gas Co., Toledo, Ohio, has secured a franchise for a natural gas pipe line across Madison County, from Ohio State line, and likewise proposes to extend to vicinity of Indianapolis.

Magnolia Pipe Line Co., a subsidiary of Magnolia Petroleum Co., Dallas, Tex., is arranging to build an additional oil pipe line from Kilgore to Corsicana, Tex., to cost over \$1,000,000.

Shell Petroleum Corp., Shell Building, St. Louis, contemplates installation of new oil pipe line from oil properties in east Texas field to a point on Gulf Coast, to cost over \$2,000,000, with pumping stations and other equipment.

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## Reinforcing Steel

### Pending Projects Gain—Awards Low

REINFORCING steel awards the past week, at 1750 tons, fell to the lowest level since the last week in December. Lettings were all in small tonnages and included none for more than 245 tons. About 6000 tons is added to projects pending, compared with 4000 tons in the previous week. Included in new jobs is 1000 tons for track elevation for the Pennsylvania Railroad in Chicago, 1000 tons for the Western Electric Co., Chicago, and 1000 tons for a Marine Hospital in Seattle, on which bids are being taken. Awards follow:

STATE OF MAINE, 200 tons, bridges, to Bancroft & Martin Rolling Mill Co.

WESTFIELD, MASS., 125 tons, State bridge, to Concrete Steel Co.

HARTFORD, CONN., 125 tons, municipal hospital, to an unnamed company.

BOSTON, 110 tons, school, to Concrete Steel Co.

GREENWICH, MASS., 100 tons, State water intake, to a Western company.

FORT JAY, NEW YORK, 150 tons, barracks on Governor's Island, to Carroll & McCreary Co.

SOUTH BEND, IND., 200 tons, engineers' building, Notre Dame University, to Olney J. Dean & Co.

SACRAMENTO, 150 tons, Institute for Women at Techachapi, to an unnamed bidder.

LOS ANGELES, 200 tons, apartment building, San Marino and Serrano Avenues, to a unnamed bidder.

RENO, NEV., 245 tons, Virgin River bridge, Clark County, to an unnamed bidder.

SEATTLE, 125 tons, plant for Tea Garden Products Co., to Pioneer Sand & Gravel Co.

### Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

CAMBRIDGE, MASS., 300 tons, Massachusetts Institute of Technology unit.

CHICOPEE, MASS., 200 tons, city bridge.

STATE OF MASSACHUSETTS, 200 tons, road work.

NEW YORK, 600 tons, sewer in Borough of Queens; previously reported as 200 tons.

NEW YORK, 200 tons, sewer on Tenth Avenue, being constructed by New York Central Railroad in conjunction with city; Remo Construction Co., New York, low bidder on general contract.

NEW YORK, 300 tons, sewer at Eleventh Avenue and Seventy-second Street, for New York Central Railroad and city; H. H. Sherwin & Co., New York, general contractor.

FORT JAY, NEW YORK, 100 tons, hospital building on Governor's Island; Robert J. Murphy, New York, low bidder on general contract.

STATE OF NEW JERSEY, 100 tons, bridge at Deal Lake, Monmouth County.

NEW YORK CENTRAL RAILROAD, 100 tons, bridge over Bronx River Parkway at Woodlawn, New York.

WASHINGTON, 180 tons, Methodist building; C. H. Tompkins Co., Washington, general contractor.

RAVENNA, OHIO, 100 tons, highway bridge.

ROCKFORD, ILL., 100 tons, newspaper plant.

CHICAGO, 1000 tons for Western Electric Co.

CHICAGO, 1000 tons, track elevation for Pennsylvania Railroad.

HIGHLAND PARK, ILL., 200 tons, sanitary district.

CHICAGO, tonnage not stated, Marshall Field Estate building.

ST. LOUIS, 3660 tons, warehouse for Illinois Terminal Warehouse Co., previously reported as 4500 tons; Selden-Breck Construction Co., low bidder.

SEATTLE, 1000 tons, Marine hospital; bids being taken.

SEATTLE, 340 tons, Albion Place viaduct; bids June 12.

SACRAMENTO, 260 tons, widening bridge over Santa Ana River in Riverside County; bids June 24.

## Russia to Take Part in World Economic Meeting

Soviet Russia's experience with economic planning will be told officially at an international meeting for the first time at the World Industrial Relations Congress to be held at Amsterdam, Holland, the week of Aug. 23, it is announced by Mary van Kleeck, vice-president of the International Industrial Relations Association.

The subject of the congress is social economic planning and its possibilities for correcting the present lack of balance between production and purchasing power in the different nations and in international trade. The experience of the United States with scientific management, of Italy with Fascist control of industry, and the efforts of Germany, France and other countries with national economic planning will be analyzed.

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## Railroad Equipment

Pennsylvania Railroad is inquiring for electrical equipment for 80 electric locomotives, in addition to 150 for which equipment has recently been ordered. Orders for the locomotives proper probably will be placed soon. This road will also buy 3250 steel truck containers for freight cars.

Cleveland Electric Illuminating Co. has ordered two 70-ton hopper cars from Bethlehem Steel Co.

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## Cleveland Iron and Steel Market

(Concluded from Page 1941)

steel from a Cleveland dealer to be shipped from the latter's yard stock. Two Valley plants have held up shipments. On heavy melting steel, prices above the recent minimum have disappeared.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$9.50
No. 2 heavy melting steel...	9.00
Compressed sheet steel...	\$8.25 to 8.75
Light bundled sheet	
stampings .....	7.00 to 7.50
Drop forge flashings .....	7.00 to 7.25
Machine-shop turnings .....	5.00 to 5.50
Short shoveling turnings .....	6.25 to 6.75
No. 1 railroad wrought .....	9.50 to 10.00
No. 2 railroad wrought .....	10.00 to 10.50
No. 1 busheling .....	7.00 to 7.50
Pipes and flues .....	5.50 to 6.00
Steel axle turnings .....	7.50 to 8.00
Acid Open-Hearth Grades:	
Low phos., billet bloom	
and slab crops .....	14.00 to 14.50
Blast Furnace Grades:	
Cast iron borings .....	6.25 to 6.75
Mixed borings and short	
turnings .....	6.25 to 6.75
No. 2 busheling .....	6.00 to 6.25
Cupola Grades:	
No. 1 cast .....	10.00 to 10.50
Railroad grate bars .....	6.00 to 6.50
Stove plate .....	6.00 to 6.50
Rails under 3 ft. ....	15.00 to 15.50
Miscellaneous:	
Rails for rolling .....	13.00 to 13.50
Railroad malleable .....	11.00 to 11.25

The Iron Age, June 11, 1931—1953



# British Mills May Reduce Ship Material To Aid Shipbuilding Industry

(By Cable)

LONDON, ENGLAND, June 8.

THE steel market here is dull except for small sales to Canada, and certain mills are operating at only about 25 per cent of capacity. Shipbuilders are pressing steel producers to reduce prices on shipbuilding material, which are about £2 (\$9.73) per ton more than Continental prices. If the market is not lowered, shipbuilders have threatened to withdraw from the rebate plan. Steel mills will meet in July, but some action may be taken earlier.

Ruston & Hornsby, Ltd., has asked all employees, including directors of the corporation, to accept a 10 per cent reduction in wages and salaries.

The Soviet Union has placed orders with Spear & Jackson, Ltd., Sheffield, for circular saws totaling £25,000 (\$121,500), and has ordered 175 locomobiles valued at £100,000 (\$486,000) from Marshall Sons & Co.

The Tata Iron & Steel Co., Jamshedpur, India, has sold 15,000 tons of

German railroads to aid employment will spend \$50,000,000 for rails and supplies.

\* \* \*

Renewal of Continental Steel Cartel expected July 1.

\* \* \*

South African Iron, Steel & Industrial Corp'n. to make first steel in May, 1932.

\* \* \*

German engineers to survey for \$40,000,000 Chinese steel plant.

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high-silicon foundry iron to Italy for June shipment.

The German railroad administration is negotiating contracts for rails and other supplies to a total of 200,000,000 m. (\$47,600,000), in an effort to improve employment in Germany.

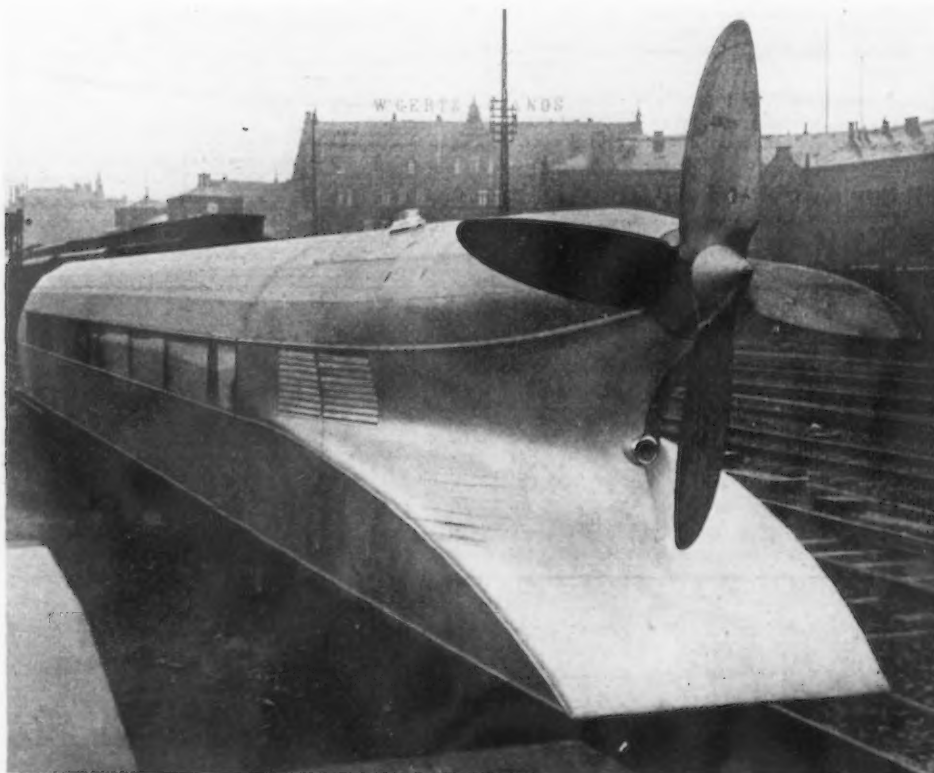
The Stahlwerksverband (Steel Works Syndicate) and Welded Tube Makers Cartel in Germany have renewed their agreement on export rebates for plates until the end of June, 1933.

Renewal of the Continental Steel Cartel is expected at a meeting July 1, as Belgium has adopted a more conciliatory attitude, although quotas have not yet been arranged. The Belgian Wire Syndicate is to be renewed for five years, subject to renewal of the Continental Wire Rod Cartel by the end of June.

The South African Iron, Steel & Industrial Corp'n. expects to begin production of steel at the new plant near Pretoria, South Africa, in May of next year.

The British pig iron market is unimproved. Cleveland makers have ample supplies, and Dorman, Long & Co. has blown out another furnace, leaving only 22 Northeast Coast furnaces operating. Pig iron sellers continue to grant concessions on sales to Scotland, but have been unable to se-

## GERMAN CAR TO COMPETE WITH AIRCRAFT



THE propeller-driven railroad car, which has been developed in Germany, recently transported passengers on an experimental round trip from the railroad station at Hanover. The German Reichsbahn has ordered 10 of these propeller cars and regular service will be instituted shortly between Berlin and other German cities where air lines have been offering increasing competition in passenger and mail transport.

The car, which is of all-metal construction, is full streamline in design and on test runs has developed speeds of 180 to 200 km. (112½ to 125 miles) per hr. Operating costs are said to be low and recent improvements permit regulation of speed to track conditions, especially necessary for present operation, as railroad track now in use is not generally adapted to such high speeds. The propeller-driven car will operate at maximum advantage in the lowlands, where there are comparatively long stretches of straight track.

**British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)**

**British Prices, f.o.b. United Kingdom Ports**

Ferromanganese, export.	£9 0s.			\$43.74
Billets, open-hearth....	5 0	to	£5 7½s.	24.30 to \$26.12
Black sheets, Japanese specifications	10 5			49.82
Tin plate, per base box..	0 14	to	0 14½	3.40 to 3.52
				Cents a Lb.
Steel bars, open-hearth..	7 17½	to	8 7½	1.71 to 1.81
Beams, open-hearth....	7 7½	to	7 17½	1.60 to 1.71
Channels, open-hearth....	7 12½	to	8 2½	1.66 to 1.76
Angles, open-hearth....	7 7½	to	7 17½	1.60 to 1.71
Black sheets, No. 24 gage	8 10			1.84
Galvanized sheets, No. 24 gage	10 2			2.17

**Continental Prices, f.o.b. Antwerp or Hamburg**

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 6s.	to	£2 7s.	\$11.19 to \$11.42
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Billets, Thomas (nominal)	£3 3s.	to	£3 4s.	\$15.31 to \$15.55
Wire rods, low C., No. 5 B.W.G.	5 0	to	5 5½	24.30 to 25.64
Rails, light	6 0			29.20
Black sheets, No. 31 gage, Japanese.....	11 5	to	12 12	54.68 to 58.32
				Cents a Lb.
Steel bars, merchant....	3 9	to	3 10	0.75 to 0.76
Beams, Thomas, British standard (nominal) ..	3 7	to	3 8	0.73 to 0.74
Channels, Thomas, American sections .....	5 12	to	5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick .....	3 8	to	3 9	0.74 to 0.75
Angles, Thomas, 3-in....	3 10	to	3 11	0.76 to 0.77
Hoops and strip steel over 6-in. base.....	4 4	to	4 5	0.91 to 0.93
Wire, plain, No. 8 gage..	4 18½			1.08
Wire, barbed, 4-pt. No. 12 B.W.G.....	8 12½			1.90

cure much tonnage. There is almost no export business.

British producers of ferromanganese are asking £9 (\$43.74) per ton, f.o.b. port, and show less inclination to meet the low prices encountered in Belgium.

Welsh sheet bars have been reduced 7s. 6d. (\$1.82) per ton to £4 12s. 6d. (\$22.48) per ton, but foreign sheet bars are still obtainable at £3 15s. to £4 (\$18.23 to \$19.44) per ton. As a result tin plate quotations are irregular. Mills using foreign steel have quoted as little as 14s. (\$3.40) per base box, and consumer interest is increasing. Inquiries for tin plate include some fair tonnages, consumers evidently believing it to be an advantageous time to buy.

Galvanized sheets are selling at £10 per ton (2.17c. per lb.), but buying is still small. Black sheets are quiet.

Italian production in March included 122,000 tons of rolled steel, and in April, 43,000 tons of pig iron and 125,000 tons of raw steel.

## Equipment Obsolescence Studied in Germany

HAMBURG, GERMANY, May 27.—The Federation of German Machinery Manufacturers has been engaged in a survey to determine the average period of service of various equipment before it may properly be classified as obsolete. The investigation sets minimum years of service, finding five years for annealing furnaces, seven years for steam, gas and air pipe lines, two years for transmission belts, eight years for low-pressure or superheated steam boilers, 10 years for steam engines, eight years for Diesel engines and electric motors, 10 years for railroad tracks, eight years for cranes and elevators, and four years for electric conveyors. The survey points out that these are minimum age limits, and that under certain conditions the age of service before obsolescence may be increased 30 to 50 per cent.

## German Bolt Makers Organize Cartel

DUSSELDORF, GERMANY, May 28.—Bolt and nut makers have formed a syndicate to be known as the Deutsche Schraubensyndicat G.m.b.H. The new syndicate has acquired seven of the smaller German bolt and nut manufacturers and plans to close the plants to avoid overproduction. Within the next few weeks the new cartel will begin export selling, but control of world market prices is not possible as no agreement has been made with Belgian and Dutch makers.

## Merger of Three Plants Proposed in Japan

YOKOHAMA, JAPAN, May 9.—A merger of the Japan Steel Tube Co., Fuji Steel Mfg. Co. and the Asano Shipbuilding Co. has been proposed and given some consideration as a better means of improving present market conditions than the formation of a joint selling organization. Successful completion of such a merger is doubted in certain quarters because of wide differences in the financial position of the individual companies.

## Soviet Credits Costly To German Sellers

BERLIN, GERMANY, May 28.—German manufacturers, who recently sold a substantial total of steel mill equipment to the Soviet Union, paid the German Government a 2 per cent premium for the credit guarantee, which, however, did not cover the total amount involved. The Government has now increased its premium for these credits to 3½ and 4 per cent of the invoice total, and, in addition, the seller to Russia must obtain private insurance, mostly with British

and Dutch companies, which charge premiums of 5 to 7 per cent, depending upon the terms of the credit extended. This high cost of credits is understood to be the reason why German companies would not accept additional large orders offered two weeks ago by the Soviet Union.

## "Pre-Formed" Wire Rope Licensed in Europe

HAMBURG, GERMANY, May 27.—According to the Felten & Guillaume A. G., Cologne, an agreement has been reached between the American Cable Co. and certain foreign cable makers under which the American company grants licenses to manufacture "pre-formed" wire rope. Among the participants are the Australian Wire Rope Co., British Ropes, Ltd., Felten & Guillaume A. G. and a Canadian maker.

## Germans Make Survey For Chinese Steel Plant

HAMBURG, GERMANY, May 27.—A commission of German engineers will sail shortly for China, at the request of the Nanking Government, to make preliminary surveys for a large steel plant, reported in THE IRON AGE, May 21. The works, which will probably be established near Pukow, will be built for an annual capacity of 150,000 tons of steel and a daily output of 500 tons of pig iron. The principal products will be rails and structural shapes. In addition to the plant, the Nanking Government plans construction of a railroad, connecting the present main lines, and modernization of the iron ore mines in the Yangtze Valley. The estimated total cost of the plant and improvements is \$40,000,000. It is believed that steel can be produced profitably for Chinese consumption.

# PLANT EXPANSION AND EQUIPMENT BUYING



## Machine Tool Markets Listless

**M**ACHINE tool markets have developed the sluggishness generally associated with midsummer. Orders and inquiries are at a minimum, working forces in many of the machine tool plants have been reduced to a mere nuclei, and the trade is reconciled to the expectation of a few months more of dullness.

At Chicago the Board of Education placed orders for 24 13-in. x 5-ft. lathes, a high spot in a market which appears to have neither gained nor lost in volume of business in the past week. Elsewhere the trend seems to have been downward, if it is possible to reckon a decline from the low point that has existed for some weeks. The

## Volume of Orders and Inquiries Small with No Early Revival in Sight

Santa Fe Railroad has also placed orders at Chicago for a number of tools.

With many factories and dealers May sales were the smallest for any month this year, and in some instances the past month was the poorest during the entire period of the depression.

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### NEW YORK

The course of the machine tool market in the past week was a repetition of the conditions that have prevailed for several weeks. Orders and inquiries are at a minimum, with little in the situation to encourage the hope that an early revival in demand is likely to occur. May sales were very small, having declined from those of April. Thus far, June has brought no signs of a change.

### CINCINNATI

Fresh bookings of machine tools continue small. Orders call for single items and reflect the cautiousness of users generally. Operations are about sufficient to retain a nuclei of former forces. Inquiries have fallen off with the beginning of summer weather.

The Amtorg Trading Corp. is asking for quotations on four lathes.

### MILWAUKEE

New machine tool business is of small volume and inquiry is listless. The average order calls for one unit and rush delivery is generally specified. Shop owners are hesitant about making investments in equipment despite of the fact that this may be called a buyers' market, preferring to await actual needs. The maintenance of

payrolls in foundries and machine shops is considered a favorable sign.

### CLEVELAND

With few sales and little inquiry the past week has been disappointing for the machinery trade. Salesmen are attempting to arouse interest in replacement machines to reduce production costs, but this is not having much effect in plants where there is considerable idle equipment. Little activity is looked for during the summer. There is still some small lot buying of machinery in this district for shipment to Russia.

### CHICAGO

Demand for machine tools appears neither to have gained nor to have lessened so far this month. The Chicago Board of Education has placed orders for 24 13-in. x 5-ft. lathes for the Austin High School, and the Santa Fe has placed several additional items that had been held over from its list. It is reported that the Milwaukee Road is paring down its car shop list, issued in the spring, and purchases will be made against only a small part of the original list. This railroad is sending out an inquiry for a small grinder. Local interest in a Great Northern list is not high for the rea-

son that this railroad usually places orders in the Twin Cities.

### NEW ENGLAND

The slight improvement in machine tool orders, noted a week ago, has lapsed, and the market is again dull and listless. A feeling persists in the trade, however, that business will improve this summer, based on a slow yet gradual increase in machine shop and plant activities at many New England points.

### PITTSBURGH

Conditions in the machinery market have not changed materially in the last fortnight. Sales during May with some dealers were the poorest of any month this year. Placing of orders for electric locomotives by the Pennsylvania has brought about the release of a few tools which had been contracted for earlier in the year by electrical companies. Scarcely any consequential inquiry is coming out. The Pittsburgh Board of Education has been in the market for a few tools and some smaller towns in the district have taken similar action.

Business with makers of heavy machinery and equipment has been quiet in the last few weeks, but inquiry under negotiation is reported to be quite satisfactory.



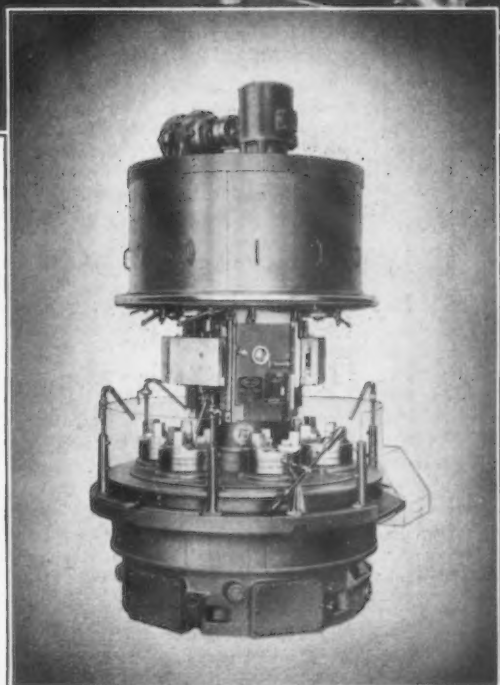
# THE

# BULLARD

# METHOD



MULT-AU-MATIC SIZES  
6"  
8"  
12"  
16"



Machining  
Stamped  
Steel  
Hub

**H**AVE you similar jobs where the requirements are boring, turning and facing, with perhaps an odd shape or having drilling or threading operations, yet within the Mult-Au-Matic range of sizes? If you have, and wish to reduce your machining costs, our Engineers will gladly submit estimates. Send us your problems with prints or samples.

**THE BULLARD COMPANY**  
Bridgeport Connecticut

## New York

**I**NDUSTRIAL plant and property on Thirty-second Avenue, Jamaica, L. I., 435 x 539 ft., has been leased by Empire State Concrete Pipe Corp., David W. Newberger, president, and will be remodeled at cost of over \$50,000 for production of cast concrete pipe of large section.

Signal Supply Officer, Army Base, Brooklyn, is asking bids until June 22 for generator units in lots of 400 to 1000; cranks in lots of 900 to 2500; until June 15 for 11,229 ft. cable.

Staten Island Edison Corp., Port Richmond, S. I., has arranged for sale of a note issue to total \$7,500,000, part of fund to be used for extensions and improvements in plants and system.

Department of Correction, Municipal Building, New York, and Board of Education, Park Avenue and Fifty-ninth Street, are arranging for establishment of vocational schools at six of municipal penal institutions, including reformatories on Hart's Island and at New Hampton, Orange County. Equipment will be installed during summer. Joseph F. Fishman is Deputy Commissioner of Correction.

Hudson River Stone Corp., North Hempstead, L. I., has taken over more than 1000 acres of granite properties near Cold Spring, Putnam County, and will install machinery for a new granite cutting and finishing plant, including hoisting, conveying, loading and other equipment.

Preferred Foundry & Machine Corp., New York, has been organized with capital of \$100,000 to take over and expand Preferred Foundry & Machine Co., 132 Nassau Street, manufacturer of iron and steel castings, machinery, etc. Paul A. Collins, 187 West 135th Street, is one of incorporators.

H. M. Hillman, 188 Flatbush Avenue Extension, Brooklyn, manufacturer of brass and copper products, has plans for a one-story addition to cost about \$45,000 with equipment. Part of unit will be used for storage and distribution. Erling Owre, 53 Fort Hill Circle, St. George, S. I., is architect.

City Armory Board, Municipal Building, New York, has authorized installation of a machine shop in new armory to be erected at 168th Street and Ninety-third Avenue, Jamaica, L. I., to cost \$1,750,000. A steam power plant will also be installed. Charles B. Meyers, 31 Union Square, New York, is architect.

Lorraine Steel Works, Inc., Brooklyn, care of Morris Levine, 215 East 164th Street, recently organized by Mr. Levine and associates with capital of \$30,000, will operate local plant for manufacture of iron and steel specialties.

New York Power & Light Co., Albany, N. Y., a subsidiary of Niagara-Hudson Power Corp., Buffalo, is planning erection of a new power substation at Poughkeepsie, N. Y., to cost over \$700,000 with connecting power lines. Company engineering department is in charge.

Transit Commission, 270 Madison Avenue, New York, has awarded a contract

to P. T. Cox Contracting Co., 151 Nassau Street, for foundation for a new multi-story freight terminal at Spring and West Streets, at cost of \$2,267,899. Entire structure will cost about \$10,000,000 and will include loading and handling equipment, conveying and other machinery.

Atlantic Plumbing Supply Co., Long Branch Avenue, Long Branch, N. J., has awarded general contract to Joseph Perrino, Long Branch, for one-story pipe shop, to cost close to \$20,000 with equipment.

Sincock-Bachofner, Inc., 90 Orchard Street, Newark, operating a metal refining works, has leased one-story building, 100 x 150 ft., at 229-37 Murray Street, for new plant.

Officials of Mackay Radio & Telegraph Co., 67 Broad Street, New York, have organized Kolster Radio, Inc., to take over plant and other assets of Kolster Radio Co., 350 Thomas Street, Newark. It is proposed to resume operations soon. Kolster company has been in receivership for several months and was recently acquired by Orange Securities Corp., Orange, N. J., in which Mackay company holds controlling interest. Kolster acquisition also includes its subsidiary, Federal Telegraph Co., 625 Market Street, San Francisco, manufacturer of international telegraphic equipment, etc. Mackay company is affiliated with International Telephone & Telegraph Co., New York. Franklin Hutchinson will be president of new Kolster organization.

Board of Education, Leonia, N. J., contemplates installation of manual training equipment in new three-story and basement high school to cost over \$500,000, for which plans will be drawn by Hacker & Hacker, 201 Main Street, Fort Lee, N. J., architects.

Public Service Electric & Gas Co., Terminal Building, Newark, has secured permission from Town Council, Irvington, N. J., to build an addition to power substation at Irvington Center, to cost over \$80,000 with equipment.

Sands Brothers, 1099 Goffle Road, Hawthorne, N. J., are considering erection of a two-story and basement ice-manufacturing plant, to cost close to \$50,000 with equipment.

James G. Clark Co., Newark, manufacturer of fire extinguishers, ventilating equipment and portable steel buildings, has removed its factory from 132 New Jersey Railroad Avenue to 14-16 Dawson Street.

## Buffalo

**S**UPERSTRUCTURE will soon be started by duPont Cellophane Co., Inc., River Road, Buffalo, manufacturer of transparent wrapping materials, on several multi-story units to cost about \$2,000,000 with machinery. duPont Engineering Co., duPont Building, Wilmington, an affiliated organization, is engineer.

John J. Yager, 272 Carlton Street, Buffalo, and associates have organized Banner Heater Co., Inc., and plan operation of local factory for manufacture of heat-

ing equipment and appliances. John J. Schweitzer, 12 Coolidge Road, is interested in new company.

Allegheny Refineries, Inc., Bolivar, N. Y., lately formed by Wallace E. Sawyer, Bolivar, and associates with capital of \$500,000, has engaged Herbert Ross, Warren, Pa., consulting engineer, to prepare plans for oil refinery near Bolivar, on property recently purchased. Initial unit will cost close to \$200,000.

Vesta Consolidated Corp., Buffalo, has been organized to take over and consolidate Vesta Battery Corp., 2100 Indiana Avenue, Chicago, and Consolidated Battery Co., 111 Colgate Street, Buffalo, manufacturers of electric storage batteries, parts, etc. New company will be capitalized at \$1,000,000 and 25,000 shares of common stock, no par value, and will carry out development program. It is proposed to continue both plants. Herbert W. Warden, heretofore president of Consolidated company, will be president of new organization; Samuel F. Baker, previously vice-president and general manager of Consolidated company, will be vice-president.

Utilities Foundry Co., Port Ewen, N. Y., formerly a department of Gillie Machine Co. and now a separate company, has elected Arthur Whitcraft as president; Edward Bieswanger, vice-president in charge of operation, and Alfred J. Schwartz secretary-treasurer. Mr. Whitcraft has had an experience of more than 20 years in foundry operation; Mr. Bieswanger was plant manager for Bingham & Taylor Co., Buffalo, for the past 12 years, and Mr. Schwartz, in addition to other business interests, is president of Gillie Machine Co.

## New England

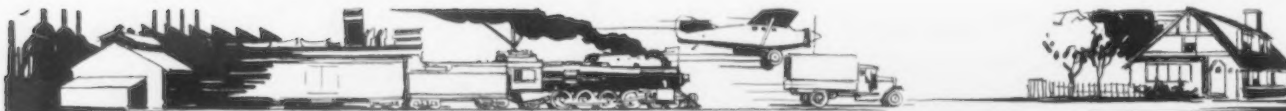
**B**OARD of Selectmen, Hamilton, Mass., plans installation of manual training equipment in new two-story and basement high school to cost about \$175,000, for which bids are being asked on general contract. Charles G. Loring, 7 Water Street, Boston, is architect.

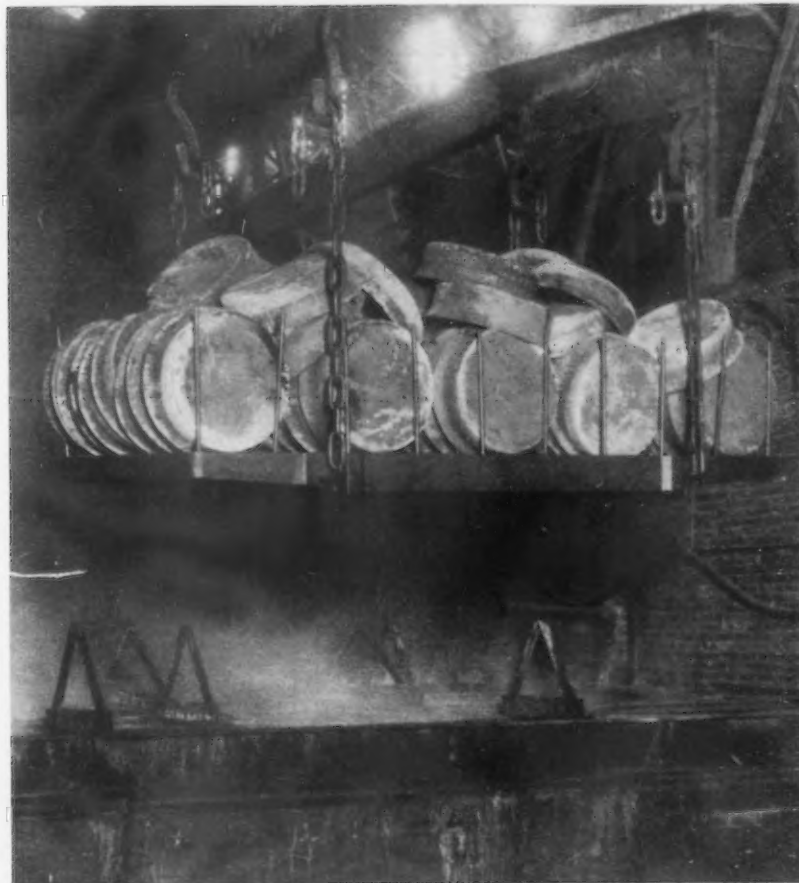
Electro-Lyne Corp., Boston, care of Lewis N. Gilman, Allerton, Mass., recently organized by Mr. Gilman and associates with capital of \$95,000, plans operation of local factory for manufacture of gas and electric appliances. Mr. Gilman will be treasurer; John W. Alvis is president.

Warren Foundry & Pipe Co., 201 Devonshire Street, Boston, manufacturer of cast iron pipe, etc., has filed plans for a one-story addition to cost over \$35,000 with equipment.

New Bedford Gas & Edison Light Co., New Bedford, Mass., has arranged for a note issue of \$4,500,000, part of proceeds to be used for expansion and improvements in properties.

Aviation Committee, Hartford Chamber of Commerce, Hartford, Conn., James B. Slimmon, chairman, has asked bids on revised plans for a new hangar at Brainard airport, 100 x 100 ft., with repair shop, to cost over \$65,000 with equipment.





## PICKLING RACKS..of

## Durimet Alloy Steel reduce the per-year costs

The successful reduction of maintenance costs through the use of Durimet pickling equipment invites careful consideration.

Durimet, our nickel-chrome-silicon steel, was developed primarily as an alloy, resistant to weak solutions of sulphuric acid, both hot and cold. It is equally valuable for many other corrosives. It is much stronger than mild steel, and is malleable and ductile.

**E**ASE of fabrication and corrosion-resistance make Durimet also especially useful and economical for wood-tank tie rods, pickling barrels, baskets, crates, pins, sling chains, link chains for bar picklers and other pickling equipment. Being a ferrous alloy, there is no danger of coppering the material being cleaned. Full information on request.

For these reasons, Durimet stands out as an almost unique alloy for pickling racks and other pickling equipment. Its high resistance to heat and pickling and plating solutions amply justifies its use . . . Long life . . . greatly lowered replacement expense . . . is the result.

Add to this an exclusive advantage of Durimet . . . *resistance to ferric sulphate* . . . another economy value.

Racks and other equipment are produced to your specifications. Let us co-operate with you in meeting your requirements.

THE DURIRON COMPANY, INC.  
438 N. Findlay St. Dayton, Ohio

# DURIMET

Highly Resistant to Corrosion and Heat



Isaac A. Allen & Son, 100 Farmington Avenue, are architects.

Board of Selectmen, Methuen, Mass., is contemplating a municipal electric light and power plant, to cost over \$65,000 with equipment.

Elevating, conveying, loading and other equipment will be installed in new three and six-story storage and distributing building to be erected by Northeastern Storage & Distributing Corp., 93 Grafton Street, Worcester, Mass., for which revised plans are being prepared by Howe & Lescaze, 250 East Forty-third Street, New York, architects, to cost about \$900,000.

Electric Boat Co., Groton, Conn., is arranging for increased operations following receipt of contract from Navy Department for construction of new submarine at cost of \$3,297,000. Employment will be given to about 400 additional men.

Naugatuck Chemical Co., Naugatuck, Conn., is repairing a plant recently damaged by explosion, and has conveying equipment under consideration.

General Fire Extinguisher Co., Providence, R. I., has purchased interest of late Lothar Zifferer in Columbia Malleable Casting Co., Columbia, Pa., which gives Providence company complete control of the casting company. No change in name, personnel or operating schedule is contemplated.

## South Atlantic

**S**UPERSTRUCTURE is scheduled to begin this month by Dietrich Brothers, 220 East Pleasant Avenue, Baltimore, operating a steel fabricating works, on one-story plant unit, 200 x 400 ft., to cost over \$100,000 with equipment.

Chief of Engineers, United States Army, Washington, will receive bids until June 16 for one rock drill, 12 sets of steel drills, one set of blacksmiths' tools, one circular saw, one wood-boring machine, one air hoist, one air compressor and other equipment.

Atlantic Refining Co., Keyser Building, Baltimore, plans rebuilding part of local bulk oil storage and distributing plant recently destroyed by fire with loss reported at \$70,000 including equipment. Headquarters are at 260 South Broad Street, Philadelphia.

Pierce, Butler, Pierce Mfg. Corp., Whitaker Building, Baltimore, manufacturer of boilers, heaters and kindred equipment with main plant at Syracuse, N. Y., has leased one-story building at 227-29 South Central Avenue, totaling about 15,000 sq. ft. floor space, for new factory branch, storage and distributing plant.

Board of District Commissioners, District Building, Washington, will receive bids until June 17 for pumping machinery for District Training School at Laurel, Md.

Board of Trustees, School District No. 29, New Brookland, S. C., plans installation of manual training equipment in new two-story and basement high school, 105 x 308 ft., to cost about \$175,000, for which bids have been asked on general contract. Wessinger & Stork, Arcade Building, Columbia, S. C., are architects.

Battery & Electric Co., Inc., 112 West North Street, Greenville, S. C., has leased one and two-story building, 165 x 250 ft.,

to be erected by local realty interests, to cost \$35,000 exclusive of equipment, and will occupy for new works, including electrical repair department for automobiles. General building contract has been let to Potter & Shackelford, Inc., Allen Building, William R. Ward, Walker Building, is architect.

Monumental Motor Tours, Inc., 23 South Highland Avenue, Baltimore, operating a motor bus service, has purchased one-story building at 413-19 South Eaton Street, for new service, repair and garage building for fleet. Structure will have accommodations for about 40 cars.

General Purchasing Officer, Panama Canal, Washington, is asking bids until June 26 for stocks and dies, vises, twist drills, scythe blades, sledge hammers, iron straps, wire rope and other equipment and supplies.

Fort Orchard Co., Mount Airy, Ga., plans erection of a two-story fruit pre-cooling and freezing plant, 50 x 80 ft., to cost over \$35,000 with equipment.

Carolina Chemical Co., 502-4 North A Street, Charlotte, N. C., recently organized by E. Wolf, Charlotte, and associates, plans operation of local plant for manufacture of industrial chemicals. Mr. Wolf was formerly connected with What Cheer Chemical Co., Pawtucket, R. I.

Bureau of Yards and Docks, Navy Department, Washington, will receive bids until June 24 for refrigerating machinery for naval training station at Great Lakes, Ill., including motor-driven ammonia compressors, liquid receivers, automatic control equipment, condensers, safety devices, etc.

## Philadelphia

**B**IDS have been asked on general contract by George P. Pilling & Son Co., Twenty-third and Arch Streets, Philadelphia, manufacturer of surgical instruments, for alterations and improvements in plant to cost over \$25,000. Balingier Co., Twelfth and Chestnut Streets, is architect and engineer.

Department of Public Welfare, City Hall Annex, Philadelphia, has plans for a one-story addition to mechanical shop at House of Correction, Holmesburg, 46 x 68 ft. Philip H. Johnson, Architects' Building, is architect. J. F. Dugan is director of department.

Pennsylvania Railroad Co., Philadelphia, has filed plans for five-story terminal building at Thirtieth and Market Streets, to include a power plant and other mechanical units, to cost over \$20,000,000.

Bitrodite Paving Co., Commercial Trust Building, Philadelphia, is considering

erection of one-story storage and distributing plant at Long Branch, N. J., to cost about \$30,000, including mixing, conveying, loading and other equipment.

Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has acquired 25,000 sq. ft. at Tenth and Westmoreland Streets as site for new power substation to cost over \$100,000 with equipment.

H. J. Pierson, Lititz, Pa., and associates have organized Walton Corp., with capital of \$200,000, to operate a local paper mill. Harold L. and Rudolph L. Walton, West Orange, N. J., will be officials of new company.

Board of Education, Souderton, Pa., has asked bids on general contract for two-story and basement high school, 145 x 160 ft., and plans installation of manual training department. Charles M. Talley, Telford, Pa., is architect.

Officials of Safe Harbor Power Co., Safe Harbor, Pa., headquarters in Lexington Building, Baltimore, affiliated with Pennsylvania Power & Water Co., same address, have organized Pennsylvania Transmission Co., to construct two steel tower transmission lines from Manor Township, Lancaster County, to Pennsylvania-Maryland State line, to cost more than \$500,000 with switching stations and other units. Company will be capitalized at \$2,000,000. Parent organization, Safe Harbor Power Co., has work under way on new hydroelectric generating plant on Susquehanna River.

J. T. Evans, Reynolds Street, Kingston, Pa., and associates have organized J. T. Evans, Inc., with capital of \$200,000, and plan operation of sheet metal works for production of building specialties, ventilating equipment, etc. Mr. Evans will be treasurer. M. S. Evans, Kingston, will be president.

Keystone Metal Stamping Works, Inc., 550 North Fifth Street, Philadelphia, has leased one-story building at Mascher and Berks Streets for new plant.

## Pittsburgh

**B**OARD of Public Education, Administration Building, Pittsburgh, will receive bids until June 16 for wood shaper for repair shop, steel files and other supplies. H. W. Cramblet is secretary.

F. Hamilton Co., Bradford, Pa., manufacturer of oil drilling and fishing tools, boilers, engines and kindred products, has leased a building at Elkland, Pa., and will remodel for new plant. Bradford works will be continued as heretofore.

American Dioxidyne Corp., Pittsburgh, recently organized by E. B. Graham, 359 South Negley Avenue, and associates with capital of \$25,000, plans operation of local factory for manufacture of fuel oil and gasoline storage and feeding systems and other metal products. James N. Lewis, 915 Irwin Avenue, is interested in new company.

Board of Education, Springdale, Pa., will have plans drawn by J. H. Phillips, Wabash Building, Pittsburgh, architect, for two-story and basement high school to cost \$150,000. Installation of manual training equipment is contemplated.

Iron City Oil Corp., 6800 Kelly Street, Pittsburgh, has plans for oil storage and distributing plant to cost over \$40,000



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All day long and every day an electric elevating truck is worked hard, changing heavy dies on power presses. Some of these dies weigh 5 tons. The truck has made a handsome saving in handling costs.

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A flat blank  $\frac{3}{8}$ -in. thick, weighing 26 lb., deep drawn into a seamless part of intricate shape, is pictured in one of the advertisements.

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with equipment. C. J. Pellegrini, 295 North Highland Avenue, is architect.

International Automatic Supply Co., Inc., Erie, Pa., recently organized with capital of \$1,250,000, has acquired former plant of J. A. Zurn Mfg. Co., Fourteenth Street, manufacturer of plumbing equipment and supplies, and will remodel for production of metal vending machine for automatic handling of safety razor blades for railroad cars, steamships, hotels, etc., including parts and assembling. Company will also manufacture other metal devices. It has closed agreement with Gillette Safety Razor Co., Boston, to furnish blades for new vending machine.

## Cincinnati

BOARD of Education, 511 West Court Street, Cincinnati, has authorized installation of manual training department in new two-story and basement school to be erected at Bond Hill, to cost \$350,000, for which bids will soon be asked on general contract. Charles F. Cellarius, St. Paul Building, is architect; William E. Bodenstein, Second National Bank Building, is mechanical engineer.

American Telephone & Telegraph Co., 195 Broadway, New York, is planning construction of a new relay station at Frankfort, Ky., to cost about \$75,000 with equipment.

City Council, Paris, Ky., will receive bids until June 15 for equipment for municipal waterworks, including pumping machinery, filtration equipment, valves, meters, hydrants, etc. Boone Baldwin is manager, in charge.

Cincinnati Stamping Co., 26-34 McMicken Avenue, Cincinnati, plans rebuilding of part of factory recently damaged by fire. Frank Hoersting is vice-president.

Contracting Officer, Wright Field, Dayton, Ohio, will receive bids until June 24 for 1800 storage batteries; until June 22 for 1800 fire extinguishers, aircraft type; until June 19 for 600 starter switch assemblies, 160 starter solenoid assemblies, etc.

Board of Trustees, Knoxville College, Knoxville, Tenn., is planning erection of new science building to cost about \$100,000 with laboratory and other equipment. Extensions and improvements will be made in power plant and additional equipment installed, to cost about \$30,000. Dr. J. Kelly Giffin is president.

United States Engineer Office, McCall Building, Memphis, Tenn., will receive bids until June 17 for 1,500,000 lb. galvanized steel strand wire.

## Chicago

BIDS will be asked soon on general contract by J. F. Bittermann Steel Products Co., 1401 East Cass Street, Joliet, Ill., for new one-story plant unit, 90 x 200 ft., to cost over \$100,000 with equipment.

Signal Corps Procurement District, Chicago, is asking bids until June 16 for 700,000 steel dowel pins, 50 galvanometers and other equipment.

Union Pacific Railroad Co., Fifteenth and Farnam Streets, Omaha, Neb., has plans for new engine house with repair facilities at Cheyenne, Wyo., to cost over \$200,000 with equipment.

Vapor-Vac Mfg. Corp., Chicago, has been organized with capital of \$40,000 to manufacture heating equipment and devices. Company will take over and expand Vapor-Vac Sales Co., with plant at 3985 Milwaukee Avenue. Joseph Roth heads new organization.

H. W. Austin, State purchasing commissioner, State Capitol, St. Paul, Minn., has secured appropriation of \$70,000 from State for purchase of a new generator unit for power plant in Capitol Building, to cost \$60,000 and for stokers for same plant, \$10,000.

Iowa Railway & Light Co., Cedar Rapids, Iowa, contemplates installation of an artificial gas plant at Tama, Iowa, to cost about \$60,000.

Department of Indian Affairs, Washington, is planning construction of new one-story shops, 36 x 138 ft. and 38 x 58 ft., for woodworking, welding and other mechanical service at Indian reservation at Flandreau, S. D., to cost about \$40,000.

City Council, Vermilion, S. D., is arranging call for bids for equipment for municipal electric light and power plant to cost about \$85,000, for which plans are being completed by Charles A. Trimmer, Madison, S. D., consulting engineer.

Board of Education, Ottawa, Ill., has plans for a new one and three-story and basement addition to township high school, 180 x 200 ft., with installation of new group of manual training shops, to cost \$275,000. J. C. Llewellyn & Co., 38 South Dearborn Street, Chicago, are architects.

Robert W. Melvaine, head of R. W. Melvaine Co., 53 West Jackson Boulevard, Chicago, consulting engineer, and operating a plant for manufacture of conveying machinery and equipment at 1408 South Western Avenue, has organized Melvaine Foundry Conveyors Co., with capital of \$25,000, to take over and expand last-noted plant. Robert W. and Robert L. Melvaine head new organization.

## Cleveland

PLANS are being considered by Sterling Grinding Wheel Co., Tiffin, Ohio, for one-story addition, to cost over \$30,000 with equipment. Arthur E. Tulk is treasurer.

C. C. C. Highway Motor-Freight Co., Cleveland, has leased one and two-story building, 40 x 130 ft., to be erected by O'Neil Investment Co., 1500 Superior Avenue, for new storage and distributing terminal, and will install loading and other handling equipment. H. M. Morse, 750 Prospect Avenue, is architect.

Board of Education, Alliance, Ohio, contemplates installation of manual training equipment in connection with use of

grade school on State Street for new junior high school, work to be carried out during summer.

Burand Radiator Co., Toledo, Ohio, manufacturer of automobile radiators, etc., will be succeeded by Burand Radiator, Inc., recently organized with capital of \$25,000, which will take over works at 132 Ontario Street. William W. Burand and J. O. Hickey head new company.

McKinney Tool & Mfg. Co., 1688 Arabelle Road, Cleveland, has plans for one-story addition, 50 x 150 ft., to cost close to \$60,000 including equipment.

Waldock Packing Co., Sandusky, Ohio, meat packer, has awarded general contract to Zehner & Miller, Sandusky, for two-story addition, 115 x 120 ft., to cost over \$75,000 with equipment. Anders & Reimer, Columbia Building, Cleveland, are architects.

W. H. Davey, Mansfield, Ohio, formerly head of Empire Steel Corp., has purchased controlling interest in Canton Steel Ceiling Co., Canton, Ohio, previously a branch of Canton Art Metal Co. Company will be reorganized with Mr. Davey as head. Plans are under way for expansion to provide for more diversified line of metal products and tin plate specialties. Mr. Davey was one of organizers of Canton Sheet & Tin Plate Co., Canton. Evan Jones will be superintendent at plant; John Yohe will be secretary.

## Detroit

CONTRACT has been let to Albert A. Albrecht Co., Russell and Jefferson Streets, Detroit, by General Electric Co., Schenectady, through its subsidiary, General Electric Realty Co., same address, for multi-story factory branch, service, storage and distributing plant, 80 x 160 ft., at Third and York Streets, Detroit, to cost more than \$250,000 with equipment.

Northwestern Motor Bus Co., Bessemer, Mich., has authorized erection of new one-story service, repair and body works, 70 x 145 ft., at Ironwood, Mich., to cost close to \$40,000 with equipment.

Highland Park Tool Co., Highland Park, Mich., has arranged for change of name to Highland Park Mfg. Co., to specialize in production of small tools and mechanical equipment. Company also has authorized increase in capital from \$100,000 to \$150,000 for general expansion.

Gemmer Mfg. Co., 6400 Mount Elliott Avenue, Detroit, manufacturer of automobile steering equipment, including gearing systems, etc., has established a Canadian branch plant at Walkerville, Ont., where it is expected to develop maximum output for equipment for American cars now being made in this part of Canada, including Ford Motor Co. of Canada, Ltd.

J. W. Wells Lumber Co., Menominee, Mich., specializing in hardwood flooring, has work under way on rebuilding units recently destroyed by fire, including one-story main mill, 80 x 175 ft., with steel floor, electric-operated machinery, etc. A one-story storage and distributing





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Notice the low headroom and the adjustable mounting feature allowing unusually close side clearance where desired; pull the control ropes—observe the automatic, positive safety of the new Euclid load-brake. Picture the same hoist, enlarged, *with every load-carrying part of steel* and with Hyatt roller bearings on every shaft—and the reasons for the outstanding performance of this new Euclid unit are apparent.

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building, 100 x 150 ft., will also be built. Work will cost over \$100,000 with equipment.

Roto Pump Co., Detroit, has been organized to take over and expand company of same name with local plant at 6543 Sylvester Avenue for manufacture of pumping machinery, including parts and assembling. David W. Rust and Thomas J. Arbron head new company.

Officials of Graham-Paige Motors Corp., 8565 West Warren Street, Detroit, have organized Graham-Paige Motors, Ltd., Canada, to manufacture Graham automobiles at Walkerville, Ont., where plant was recently acquired. Work is under way on equipment installation and production will begin soon. New company is capitalized at \$150,000.

Board of Education, Otsego, Mich., contemplates installation of manual training equipment in new two-story high school to cost \$160,000, for which plans are being completed by Billingham & Cobb, Kalamazoo, Mich., architects.

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## Milwaukee

PLANS are being made by Valerius Corp., Jefferson, Wis., manufacturer of soda fountains, commercial refrigerating equipment, etc., for reconstruction of plant badly damaged by fire May 24. Main shop will be 80 x 250 ft., using present foundation. Full complement of new machinery is required. M. R. Von-Meyer is general manager.

Village of Grafton, Wis., R. P. Zaun, clerk, closes bids June 22 for construction and equipment of waterworks pumping station and sewage disposal plant, designed by Paul Clark, consulting engineer, Appleton, Wis. Project will cost about \$65,000 with distribution and collecting system.

Plankinton Packing Co., Muskego Avenue and Canal Street, Milwaukee, is taking bids for new refrigerator warehouse, 189 x 146 x 96 ft., five stories and basement, to cost \$350,000 with ice machinery, conveyors, elevators, etc. Harry S. Culver is general manager.

Mondl Mfg. Co., 40 Otter Street, Oshkosh, Wis., manufacturer of shoe repair machinery, has plans for an addition, 44 x 50 ft., three stories, with one-story wing, 20 x 50 ft.

Young Radiator Co., Racine, Wis., is installing additional equipment for production of heating units, copper radiation cabinets and inclosures. Company reports 20 per cent increase in business over past three months.

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## St. Louis

CONTRACT has been awarded by National Air Transport Co., 5936 South Cicero Avenue, Chicago, to Austin Co., Cleveland, for one-story hangar, 120 x 120 ft., with lean-to extension for repair shop at municipal airport, Kansas City, Mo., to cost \$130,000 with equipment. R. H. Higgins, address noted, is company engineer.

Spiro Gas Co., Poteau, Okla., a subsidiary of Le Flore County Gas & Electric Co., Poteau, has secured a franchise for natural gas service at Red Oak, Okla., and will begin installation of pipe lines and system soon.

Salina Grain & Milling Co., 912 West Ash Street, Salina, Kan., has awarded general contract to Keystone Construction Co., 3525 Broadway, Kansas City, Mo., for new grain elevator unit, 56 x 120 ft., and 113 ft. high, to cost about \$100,000 with equipment. I. L. Berbe, 140 South Santa Fe Avenue, is architect.

Board of Public Service, St. Louis, plans one-story steam power plant, 72 x 195 ft., in connection with new market building on Biddle Street, for which bids will be asked early in fall. Refrigerating and cold storage equipment will also be installed. Entire project will cost about \$110,000. Albert Osburg is architect for board; L. R. Bowen is chief engineer, department of buildings.

Board of Public Works, Omaha, Neb., has plans for a one-story shop and garage unit, 66 x 130 ft., for police department, to cost close to \$40,000 including equipment. G. L. Fisher, City National Bank Building, is architect.

Union Equity Cooperative Exchange, Enid, Okla., will soon begin erection of a new grain elevator unit with capacity of 419,000 bu., for which general contract recently was let to Burrell Engineering & Construction Co., 1 North Canal Street, Chicago, to cost over \$350,000 with elevating, conveying, screening and other equipment. It is proposed to build additional units later for gross capacity of 1,000,000 bu.

John B. Marquis, 6328 Northwood Street, St. Louis, and associates have organized Firex Corp., with capital of \$50,000, to operate local plant for manufacture of fire extinguishers, parts, etc.

Kansas City Southern Railway Co., Eleventh and Wyandotte Streets, Kansas City, Mo., has plans for an addition to grain elevator in Northeast Industrial District, operated under lease by Moore-Seaver Grain Co., Board of Trade Building, to cost over \$400,000, including conveying, screening and other equipment. Horner & Wyatt, Board of Trade Building, are consulting engineers.

Board of Trustees, University of Arkansas, Fayetteville, Ark., is planning call for bids in July on general contract for new two-story and basement laboratory and science building on campus, to cost about \$250,000 with equipment. H. Ray Burks, Wallace Building, Little Rock, Ark., is architect.

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## Indiana

PLANS have been completed by Fred Friedline, Kentland, architect, for new grain elevator at South Chicago, including elevating, conveying, screening and other equipment, with car docks, car dumper, etc., to cost over \$700,000. Owner's name is temporarily withheld.

Board of Trustees, University of Notre Dame, South Bend, has plans for an addition to power plant, to cost over \$75,000 with equipment. Albert Kahn, Marquette Building, Detroit, is architect and engineer.

Weymann Body Co., Inc., Indianapolis, has been organized to take over and expand plant and business of Weymann American Body Co., 1145 East Twenty-second Street, manufacturer of automobile and motor truck bodies. Incorporators include John Graham and Charles O. Roemler.

Board of Education, La Porte, is considering installation of manual training

equipment in new two-story high school addition to cost about \$125,000, for which bids are being received on revised plans until June 15. George W. Allen, La Porte Savings Bank Building, is architect.

City Council, Crawfordsville, has awarded general contract to Pickett & Gill, Continental Bank Building, Indianapolis, for new power plant to cost close to \$65,000 with machinery.

Stockholders of Advance-Rumely Co., La Porte, manufacturer of agricultural equipment and implements, have approved sale of company to Allis-Chalmers Mfg. Co., Milwaukee, which will operate acquired plant as a subsidiary. In accordance with terms of agreement, Advance-Rumely Co. is to continue corporate existence under present charter for a period of three years. Battle Creek, Mich., plant of company, valued at \$742,000 is not included in sale and will be placed on market soon.

Millholland Sales & Engineering Co., Indianapolis, manufacturer of self-contained drilling, tapping, and milling units and special production machines, has moved its plant and general offices to larger quarters at 1145 East Twenty-second Street, former plant of National Motor Vehicle Co.

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## Gulf States

APPLICATION has been made to United States Engineer Office, Tampa, Fla., by Tampa Shipbuilding & Engineering Co., Estuary Street, Tampa, for permission to build a new drydock at shipyard, 95 x 310 ft., including dredging of bay to accommodate large vessels. Project will include additional repair and construction facilities at plant.

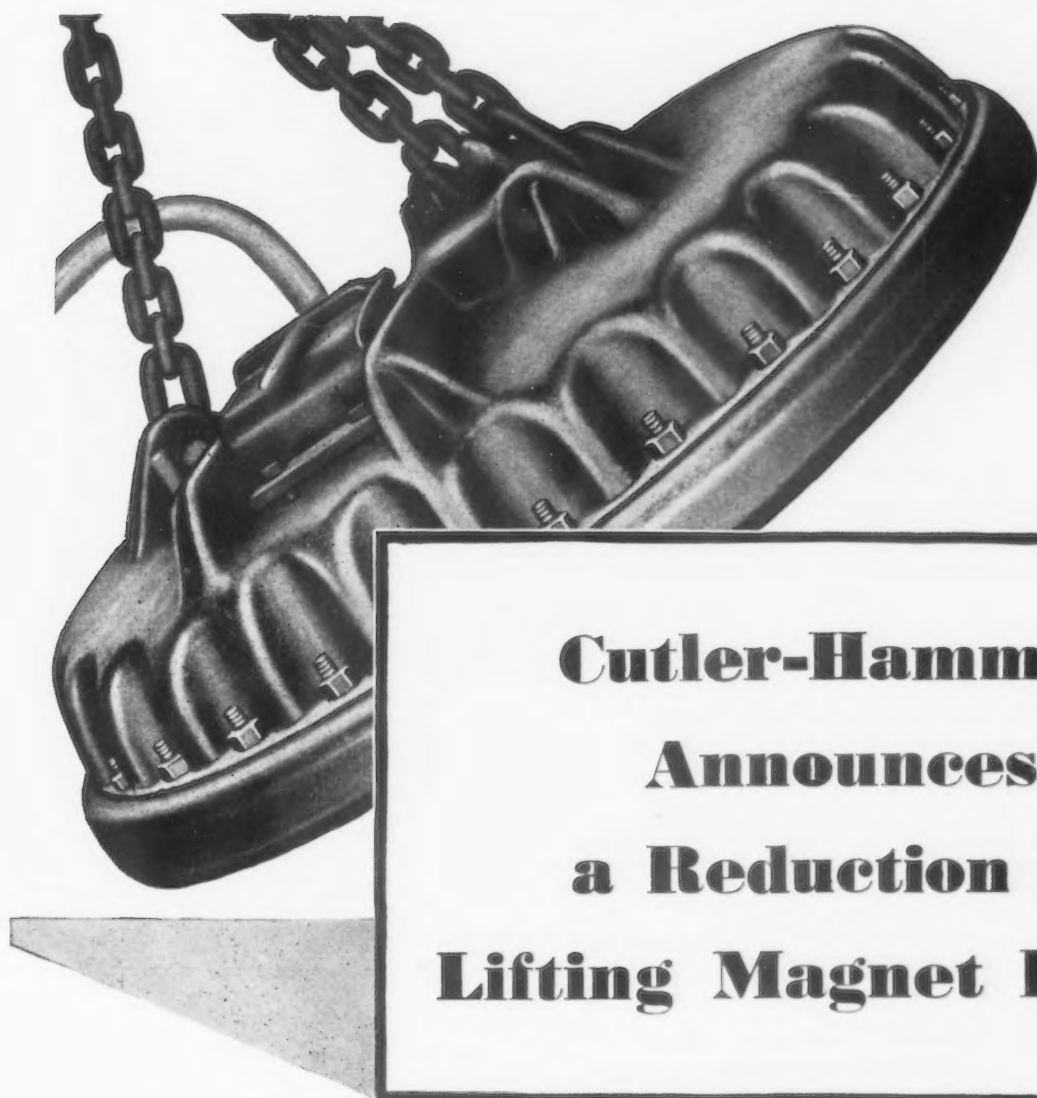
General Electric Co., Nela Park, Cleveland, Mazda Lamp Division, has leased 30,000 sq. ft. floor space in building of Morgan Warehouse & Commercial Co., Dallas, Tex., for new factory branch, storage and distributing plant. W. T. Worsley, heretofore located at Cleveland, will be local manager.

Orleans Levee Board, New Orleans, has authorized revised plans for hangars and other field units at new municipal airport now being established on shore of Lake Pontchartrain. Hangars will be increased from 100 x 140 ft., as originally laid out, to 120 x 300 ft., with larger facilities for repair and reconditioning departments. Entire project will cost over \$200,000. John Klorer is chief engineer for board.

Independent Refining Co., Mineola, Tex., has acquired site at West Mineola for a new oil refinery, to cost over \$400,000 with machinery. A large storage and distributing plant will be built.

Atchison, Topeka & Santa Fe Railroad Co., Dallas, Tex., has resumed work on repair shop program at Cleburne, Tex., begun several months ago and now about one-half completed. Erection will soon be placed under way on a one-story storage and distributing plant to cost over \$50,000 with equipment and will be followed by other units. Entire program was originally estimated to cost over \$3,000,000.

Mancuso Cooperage Co., Kenner, La., has asked bids on general contract for a one-story plant at New Iberia, La., 70 x 105 ft., to cost about \$40,000 with machinery. Equipment will be electrically operated. Theodore L. Perrier, Maritime Building, New Orleans, is architect.



## **Cutler-Hammer Announces a Reduction in Lifting Magnet Prices**

**F**OR some time, the Cutler-Hammer organization has been working toward lower magnet prices—working carefully so as not to disturb the high quality we have been at such pains to achieve.

The goal has been reached. Cutler-Hammer is happy to announce that, effective June 8th, 1931, all Lifting Magnet prices will be reduced. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1262 St. Paul Avenue, Milwaukee, Wisconsin.

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*Red Top Heavy Duty Lifting Magnets*



## ▲ ▲ Business as Others See It ▲ ▲ Digest of Current Financial and Economic Opinion

**B**ELIEF that, despite the present dragging level of activity, we can look back soon upon depths which reached their nadir in the first half-year is reiterated by Harvard Economic Society. "Cyclical decreases in business have limits, both in extent and in duration, and the limits of a major (but not exceptionally long) depression have now been reached," says that authority.

"Moreover," the statement goes on, "the situation is typical in that, in advance of increases of general business volumes, improvement has taken place in certain significant directions." Manufacturing activity is cited, and the lack is noted of those factors which, in the past 75 years, have produced exceptionally long depressions.

Distribution of goods is picking up, according to *Commerce and Finance*. And many observers seek to distinguish between physical volumes and dollar volumes, knowing that the great changes in prices have made the latter unreliable for comparisons, particularly over any considerable period of time.

Whether the hen of business re-

covery will precede the egg of expanding foreign markets, or vice versa, is argued, with opinions well divided. *New York Times* thinks improvement in foreign trade a prerequisite to domestic improvement. Other observers—including many across the seas—look to America to lead the way out.

Whether volume of business or price levels will lead the up-climb seems to be a moot question. That prices will follow volume is argued by a writer in *New York Times*. National City Bank of New York notes a marked contrast between the trend of business (indexes of production and trade) and stock and commodity markets (prices). In April and May, "business has gained in volume rather than lost, but prices have almost continuously found new lows."

Four independent indexes of general business are plotted by that bank on one chart. All show improving trends. They are the indexes of Federal Reserve Board, *Analyst*, Brookmire and Standard Statistics Co. And the bank's analysis of commodity inventories shows declines (from the peaks)

reaching as much as 39 per cent (cotton goods). But lead and rubber were at new peaks last month and zinc and tin less than 2 per cent down.

### Things to Stimulate Activity

April's bulge in buying has been attributed to the soldiers' bonus loans—a temporary matter. The corresponding drop in May is laid to Wall Street's spectacular bear raid. Brookmire lists a number of lines in which conditions might make excellent opportunities to build largely in the near future. Mechanical refrigeration, oil and gas heaters for household use, aviation as a dependable transport medium and "factory-built" houses are mentioned.

Alexander Hamilton Institute sees us climbing up the last-quarter slope to a level better than 1930 afforded, but not to a "normal" until after the turn of the year. The downward trend may continue for another two months, with "some betterment later on in the year." But in manufacturing "a definite revival is now under way."

Central Power & Light Co., San Antonio, Tex., has approved plans for a one-story addition to ice-manufacturing plant at Alpine, Tex., to cost over \$30,000 with machinery. Company will also make extensions and improvements in electric power plant and ice-manufacturing plant at Eagle Lake, Tex., to cost close to \$40,000 including equipment. John M. Marriott, Frost National Bank Building, San Antonio, is architect.

United States Engineer Office, Vicksburg, Miss., will receive bids until June 16 for 20 30-ft. sections steel welded dredging pipe, with 16-in. inside diameter flange.

Board of Education, Dumas, Tex., plans installation of manual training equipment in new two-story high school to cost about \$160,000, for which bids will soon be asked on general contract. Guy A. Carlander, Fisk Medical and Professional Building, Amarillo, Tex., is architect.

Celo Co. of America, Inc., Tampa, Fla., manufacturer of syrups, extracts, etc., has acquired four-story building on local site for expansion. Automatic bottling, sealing, mechanical-handling and other equipment will be installed.

## Pacific Coast

**B**IDS will soon be asked on general contract by California Lime & Products Co., Lincoln, Cal., for initial units of new plant near Antelope, Sacramento County, consisting of lime hydrating

plant, dry ice-manufacturing works, and development of limestone quarry, with quarrying machinery, cableways, bunkering system and raw material storage. Entire project will cost over \$650,000 of which close to \$125,000 will be used for quarry development. Smith-Emery Co., 651 Howard Street, San Francisco, is engineer. R. L. Hollingsworth, Lincoln, is general manager.

Stockton City School District, Stockton, Cal., is asking bids on general contract until June 17 for two-story vocational school, 60 x 145 ft., to cost about \$65,000. J. U. Clowdsley, Exchange Building, and Joseph Losekann, 1218 West Harding Street, are associated architects.

National Flying Service, Ltd., Lankershim Boulevard, San Fernando, Cal., is considering erection of new hangar unit, one-story repair and reconditioning shop, administration building and other field units on a 13-acre tract in San Fernando Valley section, where new airport is proposed, to cost over \$80,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids until July 1 for one 400,000-gal. steel tank for fuel depot at naval operating base, San Diego, Cal.

Berg Shipbuilding Co., 2629 West Fifty-fourth Street, Seattle, has plans for a one-story addition 96 x 200 ft., for boat storage and repair.

United Grain Growers, Mohler, Wash., affiliated with North Pacific Grain Growers, Inc., Spokane, Wash., A. Eugene Kelly, general manager, plan early erection of a new grain elevator, to cost over

\$100,000 with elevating, conveying, screening and other equipment.

Filice & Perrelli Canning Co., Gilroy, Cal., has plans for rebuilding local plant recently destroyed by fire, with loss over \$85,000 including machinery and conveying apparatus. New unit is expected to cost over \$100,000 with equipment.

Board of Education, Pasadena, Cal., has asked bids on general contract for a one-story vocational training shop, 94 x 222 ft., on site of old building at Pasadena junior college, for which an appropriation of \$40,000 has been made. Frederick Kennedy, Jr., 15 South El Molino Street, is architect.

## Canada

**W**ORK will be started at once by Interlocking Concrete Pipe Co., Ltd., 105 Victoria Street, Toronto, on erection of a plant in Scarborough township, Ont. W. H. Mackie is president.

Fairgrieve & Son, metal merchants, 50 Dovercourt Road, Toronto, have started work on a \$55,000 plant addition.

Walsh Brothers, Ltd., 153 Richmond Street West, Toronto, have purchased a site on Bathurst Street, for erection of a manufacturing plant. E. L. Cousins, engineer, will be in charge.

Works Committee, Hamilton, Ont., has approved engineer's plan for new sewage disposal works to cost \$440,000. Pumping equipment will cost \$183,000. J. D. McBeth, is city engineer.

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